DOCUMENT RESUME

ED 171 597 SO 011 277

AUTHOR	Haupt, Arthur; Kane, Thomas T.
TITLE	The Population Reference Bureau's Population Handbook.
INSTITUTION	Population Reference Bureau, Inc., Washington, D.C.
SPONS AGENCY	Ford Foundation, New York, N.Y.
PUB DATE	78
NOTE	65p.; Photographs may not reproduce clearly in hard copy
AVAILABLE FROM	Population Reference Bureau, 1337 Connecticut Avenue Avenue N.W., Washington, D.C. 20036 ($2.00)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Birth Rate; Cohort Analysis; Death; *Demography; Family Planning; *Futures (of Society); Global Approach; Higher Education; Human Capital; Infant Mortality; Instructional Materials; Migration; Migration Patterns; National Demography; *Population Distribution; *Population Growth; *Population Trends; Secondary Education; Social Influences; *Trend Analysis; Urbanization

ABSTRACT

This handbook offers information on population dynamics. The population data resource is intended for use by journalists, policymakers, teachers, high school and college students, libraries, advertising agencies, and family planning groups. The document is presented in 12 sections. Section I introduces demography, explains the purpose and scope of the handbook, and details population growth's impact on every facet of life. Section II identifies and describes measures and tools used by demographers to describe population. Sections III through X focus on age and sex composition, fertility, mortality, morbidity, nuptiality, migration, urbanization and distribution, and population change. For each of these topics, the handbook includes background information; a glossary of population and demographic terms; illustrations, maps, graphs, and charts; and statistical analysis of selected country and state population figures. Section XI provides a glossary of 113 population terms. The final section offers a directory of population information sources. (DB)

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The Population Reference Bureau's Population Handbook

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by Arthur Haupt and Thomas T. Kane

Population Reference Bureau
Washington, D.C.

A quick guide to population dynamics for journalists, policymakers, teachers, students, and other people interested in people

SO 011 277

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Printed in U.S.A.

Library of Congress Cataloging in Publication Data

Haupt, Arthur, 1945-
The Population Reference Bureau's population handbook.

1. Population--Handbooks, manuals, etc. 2. Demography--Handbooks, manuals, etc. I. Kane, Thomas T., 1951- joint author. II. Population Reference Bureau, Washington, D. C. III. Title. IV. Title: Population handbook.
HB871.H357 301.32'02'02 77-82142
ISBN 0-917136-02-0

Price: $2.00. Quantity prices available from the publisher.

PRB Membership rates: Individual memberships are $20 per year; $10 for college teachers; $5 for school teachers and students. Rates for school, university, and public libraries are $25; institutions or firms, $100. Contributions and membership fees to the Population Reference Bureau, a private, nonprofit educational organization, are tax-deductible.

Composed by Barton Graphics, Inc.
Printed by Moore and Moore, Inc.

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Acknowledgments

We express our special appreciation to Leon F. Bouvier, who prepared the original draft that was the foundation of the POPULATION HANDBOOK. We would also like to thank the people who reviewed the Handbook and whose comments contributed to its improvement, particularly James Echols, Henry Zivetz, Alan Chalkley, Lyle Saunders, Robert W. Gardner, Judith J. Friedman, Jacob Siegel, Conrad Taeuber, Henry Shryock, Paul Myers, Jack Rosenthal, Jean van der Tak, Leon Clark, Andrew Leighton, and Phyllis Avedon, who first suggested the Handbook and created its design. Responsibility for the finished product, however, must remain ours. Finally, we are grateful to James O'Brien, who prepared the figures, and Mira Mio, who patiently typed the drafts and redrafts.

The publication of the POPULATION HANDBOOK was assisted by a grant from the Ford Foundation.

A.H. T.T.K.

There is simply nothing so important to a people and its government as how many of them there are, whether their number is growing or declining, how they are distributed as between different ages, sexes (different groups are different in this regard), and different social classes and racial and ethnic groups, and again, which way these numbers are moving. . . .

If I were to be asked which are the most important qualities a young man or woman can bring to public life, and the participation in public affairs, I would say, first, a sound knowledge of English composition; second, a modestly exact acquaintance with the birth rate.

Daniel Patrick Moynihan, Senator from New York, at Commencement Exercises of the Capitol Page School, June 6, 1977

In the 30 seconds it took you to read Senator Moynihan's population declaration, some 115 live babies were born into the world. Some 45 people died during the same half minute, and the world thus experienced a net increase of 70 new inhabitants. This translates into an addition of more than 70 million people each year, on a planet which on July 1, 1978, already had an estimated population of 4,219,000,000.

Everyone is a member of a population, and population changes affect all of us in one way or another.

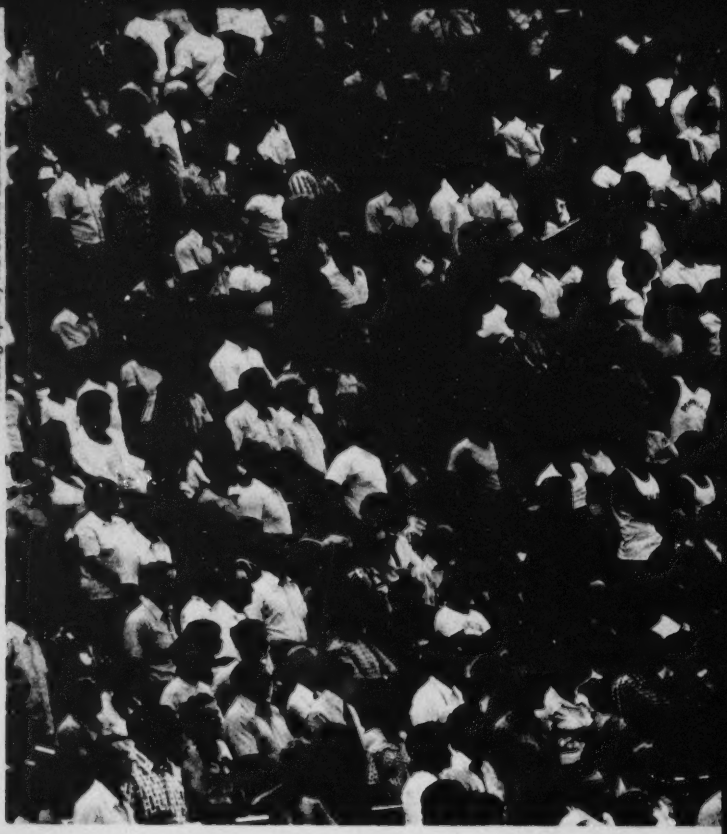
Population growth has an impact on every facet of life, from nationwide settlement patterns to the price of bread. The recent "aging" of populations, both in the U.S. and in Europe, has had reverberations in the baby-food and pop-record industries as well as in crime rates, the job market, and government retirement funds. The legal and illegal migration of Latin Americans to the U.S. influences job opportunities, revenue sharing, and even the language—English or Spanish—used on city billboards.

Historical events in turn can have a significant impact on populations. Wars can decimate a generation of men, as has happened in the Soviet Union, France, and other countries during the 20th century. A raised standard of living can result in a lowering of birth rates. Improved medical care eventually becomes manifest in increasing life expectancy and changing causes of death, while subtle environmental contamination may first be detected by rising mortality or illness in certain geographic areas.

In all these ways and more, population is news. But unlike more anecdotal stories of world events, population stories are most meaningfully told in terms of numbers and rates. It is not enough to say, "Crime is rampant," or "People are feeling prosperous these days." These stories must be quantified with precise data—How many? Where? Which sex? What proportion of the population? Over what time period? And these data must be expressed clearly and represented to mean no more than they actually mean.

Such care is not always taken. Occasionally the media report a *birth* rate as a *growth* rate. (A birth rate is only part of a growth rate, as we shall see.) Worse, a declining growth rate has sometimes been reported as though it meant that the population is declining. (But even if its growth rate declines from 3 percent to 2 percent, a population is still growing.)

Demography is the scientific study of populations. Demographers diligently scour the world for old and new data—using censuses, birth and death records, surveys, visa issuance records, even such sources as motor vehicle and school registrations. These data are analyzed and shaped into manageable form as either raw figures or rates, ratios, and other statistics. Most of the principal measures used in demography are de-



Photograph by Harold M. Lambert

fined on the following pages, together with current examples of their use. A population glossary and an extensive list of information sources (including phone numbers) are also provided.

The purpose of the POPULATION HANDBOOK is to clarify and explain demographic terminology in order to aid public understanding and to assist journalists, policymakers, teachers, students, and others who need to understand, cite, and communicate population facts. The staff of the Population Reference Bureau, which has been telling the world about population since 1929, hopes that this Handbook will prove a useful guide to one of humanity's most compelling concerns.

The Tools of Demography

Count. The absolute number of a population or any demographic event occurring in a specified area in a specified time period (e.g., 3,165,000 live births in the U.S. in 1976). The raw quantities of demographic events are the basis of all other statistical refinements and analyses.

Rate. The frequency of demographic events in a population in a specified time period (e.g., birth rate: 15 live births per 1,000 population in the U.S. in 1976). Rates tell how frequently an event is occurring—how common it is. *Crude rates* are rates computed for an entire population. *Specific rates* are rates computed for a specific subgroup—usually the population at risk of having the event occur (e.g., general fertility rate: births per 1,000 women aged 15-44 years). Thus, rates can be age-specific, sex-specific, race-specific, occupation-specific, etc.

Ratio. The relation of one population subgroup to another subgroup in the same population; that is, one subgroup divided by another (e.g., sex ratio: 95 males per 100 females in the U.S. in 1976).

Proportion. The relation of a population subgroup to the entire population; that is, a population subgroup divided by the entire population (e.g., the proportion married: 45 percent of the total U.S. population were currently married in 1976).

Constant. An unchanging, arbitrary number (e.g., 100 or 1,000 or 100,000) by which rates, ratios, or proportions can be multiplied to express these measures in more understandable fashion. For example, 0.015 live births per person occurred in the U.S. in 1976. Multiplying this rate by a constant (1,000) gives the same statistic in terms of 1,000 people, a clearer way of expressing the same thing: There were 15 births per 1,000 population. Most rates are expressed "per 1,000 population." In the formulas on the following pages, "K" means constant.

Cohort Measures. Statistics that measure events occurring to a *cohort*—a group of people sharing a common demographic experience who are observed through time. The most commonly used cohort is the *birth cohort*—people born in the same year or period. Other kinds of cohorts include marriage cohorts, school class cohorts, etc.

Period Measures. Statistics that measure events occurring to all or part of a population during one period of time—"taking a snapshot" of a population, in effect (e.g., the death rate of the whole U.S. population in 1975).

Age and sex are the most basic characteristics of a population. Every population has a different age and sex composition—the number or proportion of males and females in each age group—and this structure can have considerable impact on its demographic and socioeconomic behavior.

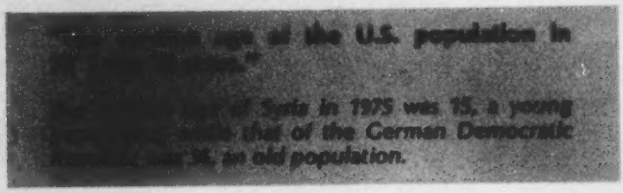
"Young" and "Old" Populations

Some populations are relatively young, with a large proportion of people in the young ages—an industrial boom town with a large proportion of young workers and their families would be an example. Other populations are relatively old—such as a Florida retirement community. These two communities have markedly different age compositions; as a consequence, they would also have different proportions of the population in the labor force or in school, as well as different medical needs, consumer preferences, and even crime patterns. Obviously, a population's age structure has a great deal to do with how that population lives.

In general, developing countries have relatively young populations while most developed countries have old or "aging" populations. In many developing countries almost half the population is under 15 years old while less than 3 percent may be 65 or over. In many developed countries, on the other hand, less than 30 percent of the population is under 15, and 15 percent may be 65 or over.

Median Age

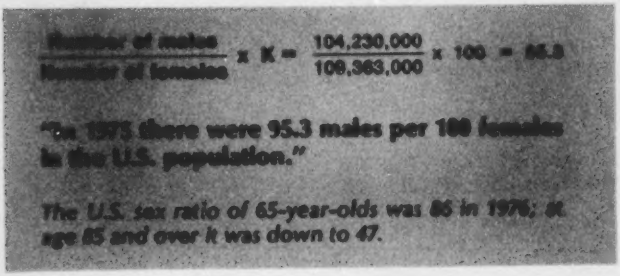
The age at which half the population is older and half is younger is a population's median age.



Sex Ratio

The sex ratio is the ratio of males to females in a given population, usually expressed as the number of males for every 100 females.

The sex ratio at birth in most countries is about 105 or 106 males per 100 females. After birth, sex ratios vary, because of different patterns of mortality and migration for males and females within the population.



Age-Dependency Ratio

The age-dependency ratio is the ratio of persons in the "dependent" ages (under 15 and over 64 years) to those in the "economically productive" ages (15-64 years) in a population.*

Where more detailed data are lacking, the age-dependency ratio is often used as an indicator of the economic burden the productive portion of a population must carry—even though some persons defined as "dependent" are producers and some persons in

*The age-dependency ratio is sometimes divided into old-age dependency (the ratio of those aged 65 and over to those aged 15-64) and child dependency (the ratio of those aged under 15 to those aged 15-64).

United Nations, G. Palmer

Frenchman with grandchildren, 1972

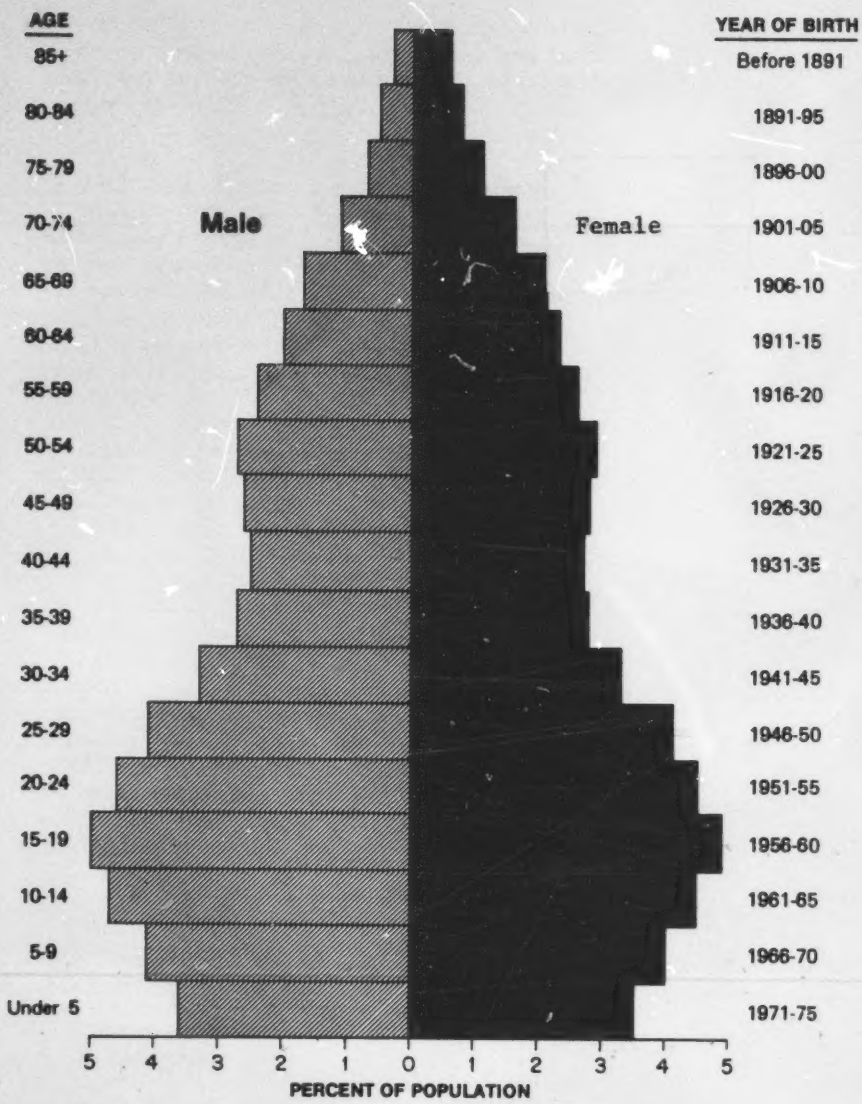
the "productive" age range are economically dependent.

Countries with very high fertility usually have the highest age-dependency ratios because of the large proportion of children in their populations.

$$\frac{\text{Population under 15} + \text{Population 65 and over}}{\text{Population aged 15-64}} \times K = \frac{52,507,000 + 22,934,000}{139,677,000} \times 100 = 54.0$$

"The age-dependency ratio in the U.S. in 1976 was 54. This means that there were 54 persons in the dependent ages for every 100 persons in the working ages."

By contrast, Libya had an age-dependency ratio of 113 in 1973, with 49 percent of its population under 15 years and 4 percent 65 and over. In Japan, the age-dependency ratio was only 47 in 1974, with 24 percent of its population under 15 years and 8 percent 65 and over.



Population Pyramid of the United States on January 1, 1976

Source: U.S. Bureau of the Census.

Population Pyramid

A population pyramid graphically displays a population's age and sex composition. By showing numbers or proportions of males and females in each age group, the pyramid gives a vivid "picture" of a population's characteristics.

The pyramid on the opposite page displays the U.S. age-sex structure as it was in January 1976. Each horizontal bar represents the size of an age-sex group. The bottom bar shows the number of males and females who were under 5 years of age in 1976. The bar located at age 30-34 on the pyramid represents all those alive and living in the U.S. in 1976 who were born 1941-1945; and so forth up to the pyramid's top, where very brief bars show the few surviving members of the birth cohorts born in the 1890s and before. Each year a new cohort is born and "appears" at the bottom of the pyramid, while the cohorts above it move up. As the cohorts age, they inevitably lose members because of death, and may gain or lose because of migration. After age 45 this attrition process accelerates, causing the narrowing peak of all population pyramids.

Such a pyramid can tell a great deal about a population at a glance. Its shape, for example, gives significant clues to a population's past and future. Look at the age groups 40-44 years old in the middle of the illustrated pyramid. This narrow middle section is the result of the sharply lowered birth rates of the 1930s, so that today these 1930s cohorts (now upwards of 40 years of age) are fewer in number than their 1920s predecessors, and much fewer than the post-World War II "baby boomers" (now in their late teens, 20s, and early 30s).

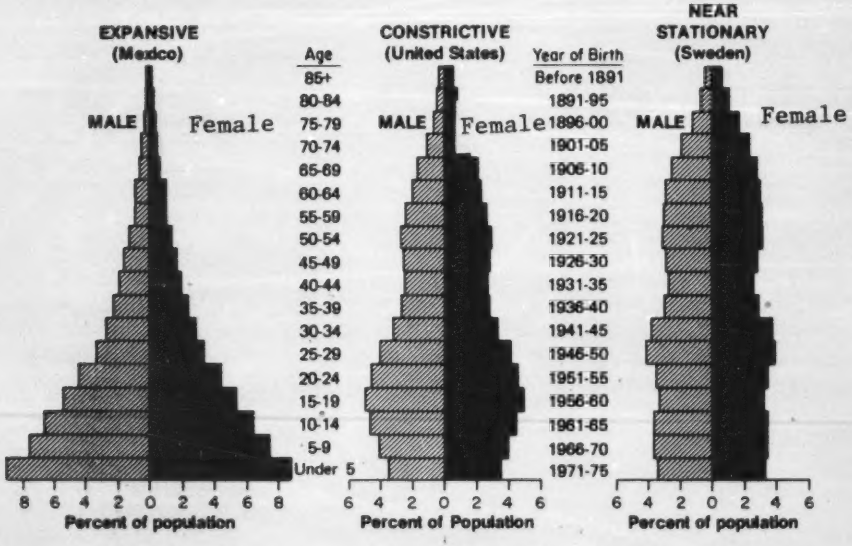
In more recent times, the bottom of the U.S. pyramid has again constricted sharply as birth cohorts have shrunk as a result of declining fertility rates. This has been called the post-1961 "baby bust," which has important long-range implications for the slowing of population growth in the U.S.

The Three General Profiles

Populations of countries can differ markedly. However, they all tend to fall into three general profiles of age-sex composition.

1. **Expansive.** Larger numbers of people in the younger ages.
2. **Constrictive.** Smaller numbers of people in the younger ages.
3. **Stationary.** Roughly equal numbers of people in all age ranges, tapering off gradually at the older ages.

As seen in the figure below, Mexico has an "expansive" population, with each cohort larger than the cohort born before it. In the U.S., recent cohorts have been progressively smaller, causing the age structure to change from "expansive" to "constrictive." And Sweden's population, with roughly equal numbers in all age ranges, can be classified as nearly "stationary."



The Three General Profiles of Age Composition

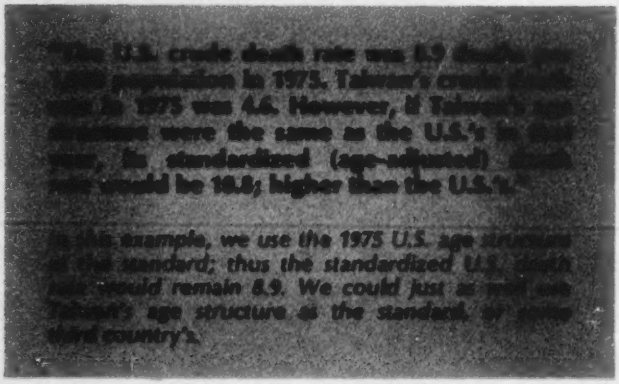
Source: Population Reference Bureau, using 1976 data.

Comparing Populations

The frequency of demographic events (like marriage, childbearing, and death) differs a great deal at different ages. A boarding school's student population would tend to have a very low crude death rate; a boom town population of young married couples would tend to have a high crude birth rate. Populations like those of Mexico, Sweden, and the U.S. tend to have different crude rates partly as a result of their age-sex composition.

Comparisons between populations using *crude* rates, which refer to the total population, should be made cautiously, bearing in mind that the differing age-sex compositions may bias the comparison. Fortunately, various procedures can be used to control for the effects of composition. One way is to compare rates as *specific* as possible—that is, rates for the subgroup of the population actually at risk (for instance, births to all Mexican married women aged 15-44 years compared with births to all Swedish married women aged 15-44.)

Another way is to *standardize* (or age-adjust) populations—that is, apply two or more countries' age-specific rates to a standard age structure (using a little simple mathematics), so that one can see how the demographic behavior of these countries would compare if they had the same age structure.



The Baby Boom and the Aging of America

In 1800 the median age of the U.S. population was 16 years; by 1977 it had risen to 29 years. This change occurred mainly because of the declining U.S. birth rate. This decline has caused a decrease in the proportion of persons in the young ages (under 15 years) and an increase in the proportion of persons in the older ages. The "baby boom" generation (born 1947-1961), the largest generation ever produced in the U.S., is now getting older, and with fewer children being born to take the baby boomers' place, the U.S. median age is gradually rising. Thus, the U.S. is an example of an "aging" population.

If the U.S. birth rate continues at its present level, when the baby boomers reach retirement age, more than 15 percent of the population will then be 65 years and over, and the median age will have risen to over 35 years.

In the year 2030 there will be an estimated 55 million elderly (65 and over) persons in the U.S.—twice as many as there were in 1975—largely as a result of the baby boomers passing age 65. Indeed, all through its lifetime, the extra-large baby boom birth cohort has created a demographic bulge in the U.S. population age structure that one demographer likens to "a goat passing through a boa constrictor."

Fertility refers to the reproductive performance of males, females, or couples in a population. The production of live births in a population is related to the number of marriages, the age at marriage (or cohabitation), the availability and use of contraceptives and abortion, economic development, the educational and occupational status of women, and the age-sex structure.

Birth Rate

The birth rate (also called crude birth rate) indicates the number of live births per 1,000 population in a given year.* Births are only one component of population change, and the birth rate should not be confused with the growth rate, which includes all components of change (see page 44).

$$\frac{\text{Number of births}}{\text{Total population}} \times K = \frac{3{,}165{,}000}{215{,}118{,}000} \times 1{,}000 = 14.7$$

"There were 14.7 births per 1,000 population in the U.S. in 1975."

Around the world, crude birth rates vary widely. Niger's 52 per 1,000 in 1977 is a very high birth rate, while Austria's 12 per 1,000 is very low.

*Most annual rates such as birth rate relate demographic events to the population at midyear (the population as of July 1), which is considered to be the average population at risk during the year.

General Fertility Rate

The general fertility rate (also called fertility rate) is the number of live births per 1,000 women aged 15-44 years* in a given year.

The general fertility rate is a more refined measure than the crude birth rate because it relates births more nearly to the age-sex group at risk of giving birth (i.e., women 15-44 years of age). This eliminates distortions that might arise because of different age and sex distributions in a total population. Thus, the general fertility rate is much more indicative of changes in fertility behavior than is the crude birth rate.

$$\frac{\text{Number of births}}{\text{Number of women aged 15-44}} \times K = \frac{3,166,000}{48,109,000} \times 1,000 = 65.8$$

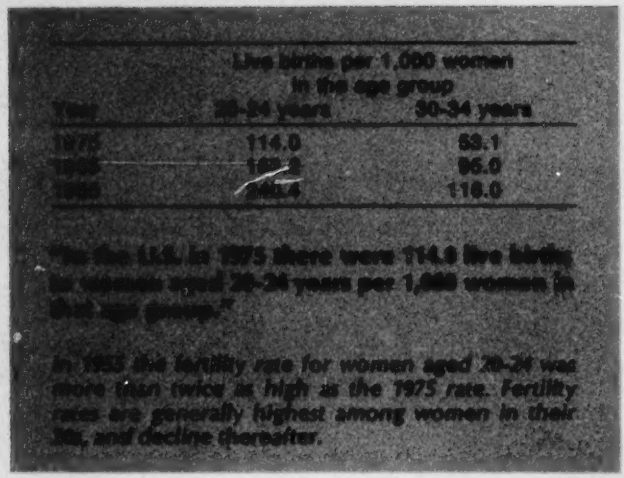
"There were 65.8 births per 1,000 women aged 15-44 years in the U.S. in 1976."

Iran's general fertility rate in 1975 was 205 live births per 1,000 women aged 15-49—one of the highest in the world. A very low rate would be Austria's 58 per 1,000 women 15-49, recorded in 1976.

Age-Specific Fertility Rates

Fertility rates can also be obtained for specific age groups for comparison over time or to see differences in fertility behavior at different ages. Compare the U.S. fertility rates for women in the different age groups on the following page.

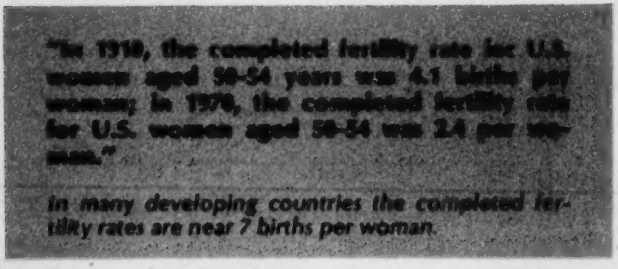
**The age of childbearing for women is arbitrarily assumed for statistical purposes to be ages 15-44 in the U.S., even though some U.S. births actually occur to women under age 15 (nearly 13,000 in 1975) and some to women over 44 (over 1,500 in 1975). In other countries, the range is often set at ages 15-49.*



Completed Fertility Rate

The completed fertility rate is the number of children actually born per woman in a cohort of women by the end of their childbearing years. Normally, women who are 45 or over are considered to have completed their childbearing years.

The completed fertility rate is a cohort measure. It answers the question: How many children on the average did a cohort of women actually have during their childbearing years?



In many developing countries the completed fertility rates are near 7 births per woman.

Total Fertility Rate

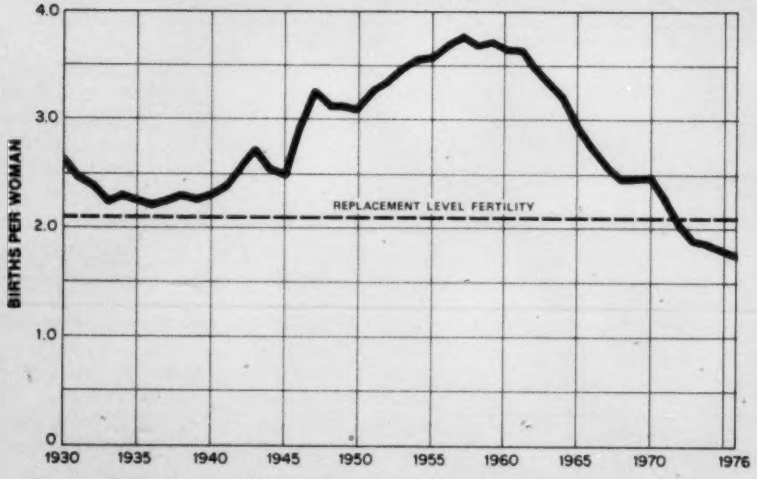
The total fertility rate (TFR) is the average number of children that would be born alive to a woman (or group of women) during her lifetime if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year.

To put it another way: The TFR of a given year indicates the total number of children that would be born to a woman if she were to behave throughout her lifetime the way women did in that year (i.e., if she experienced that year's fertility rates for women aged 15, for women aged 16, for women aged 17, etc., all the way up to age 44).

The TFR is one of the most important fertility measures. It answers as nearly as possible the question: How many children are women having nowadays?

"During the peak 'baby boom' years, the total fertility rate in the U.S. exceeded 3.7 births per woman, or 3,700 per 1,000 women. In 1975, the TFR dipped below 1.8 births per woman; that is, if the 1975 age-specific fertility rates were to continue, U.S. women on the average would have fewer than 1.8 children each during their childbearing years."

In a number of developing countries, the TFR is over 6.0 per woman, a very high rate. In many developed countries, the TFR is now under 2.0.



U.S. Total Fertility Rates from 1930 to 1976

Source: U.S. Bureau of the Census, Series P-25, No. 706.

Gross Reproduction Rate

The gross reproduction rate (GRR) is the average number of daughters that would be born to a woman (or group of women) during her lifetime if she passed through her childbearing years conforming to the age-specific fertility rates of a given year. This rate is like the TFR except that it counts only daughters and literally measures "reproduction"—a woman reproducing herself by having a daughter.

Net Reproduction Rate

The net reproduction rate (NRR) is the average number of daughters that would be born to a woman (or group of women) if she passed through her lifetime from birth conforming to the age-specific fertility *and* mortality rates of a given year. This rate is similar to the GRR, but is always lower than the GRR because it takes into account the fact that some women will die before completing their childbearing years.

Country	1975 GRR	1975 NRR
Bangladesh	3.50	2.18
Mexico	3.06	2.74
U.S.	0.86	0.83

"In 1975 Bangladesh had a GRR of 3.50, while that of the U.S. was only 0.86. That means that if 1975 fertility levels were to continue, a woman in Bangladesh would produce almost 4 daughters on the average, during her lifetime. (Since Bangladesh's NRR is 2.18, only 2 of the daughters would survive through the childbearing years.) In the U.S., by contrast, a woman would produce less than 1 daughter on the average during her lifetime."

In a developed country like the U.S., the NRR has been some 97 percent of the GRR, because most females survive through their childbearing years. In Bangladesh, however, the NRR is only 63 percent of the GRR, mainly because of the high infant and child mortality.

Replacement Level Fertility

Replacement level fertility is the level of fertility at which a cohort of women, on the average, have only enough daughters to "replace" themselves in the population. An NRR of 1.00 is equal to replacement level.

Once replacement level fertility has been reached, births will gradually reach equilibrium with deaths, and in the absence of immigration and emigration, a population will ultimately stop growing, and become a stationary population.

Today, some two dozen developed countries are at or below replacement level fertility. The U.S., with an NRR of 0.83 in 1975, is currently below replacement level. *Nonetheless, the U.S. population is still growing.* A population which has achieved replacement or below-replacement fertility may still continue to grow for some decades, since past high fertility may have led to a high concentration of women in the child-

Woman and children in Ethiopian relief camp, 1973

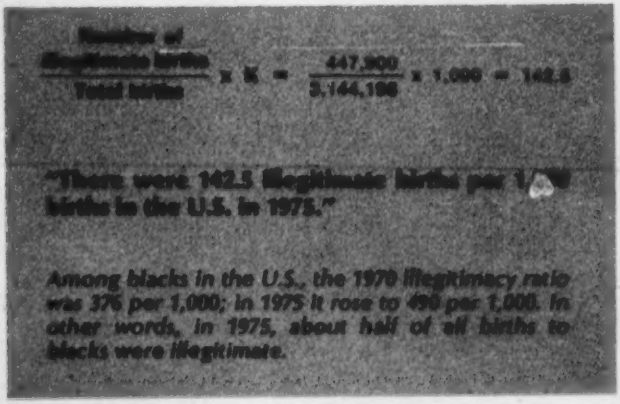
UNICEF/John Balcomb

bearing ages and hence total births continue to exceed total deaths. Thus it may take two or three generations (50 to 70 years) before each new birth is offset by a death in the population. Although replacement level fertility was reached in the U.S. around 1972, there are still over a million more births than deaths each year. The tendency of a population to continue to grow even after replacement level fertility has been achieved is known as population momentum.

The total fertility rate can also be used to indicate replacement level fertility by showing the average number of children sufficient to exactly replace both parents in the population. In the U.S. today, a TFR of 2.12 is considered to be replacement level. Why are replacement level TFRs higher than exactly 2.00 (one child for each parent)? Because there are slightly more males than females born and because not all children will survive to the childbearing years. In developing countries with much higher mortality rates, TFRs higher than 2.12 are necessary to achieve replacement level.

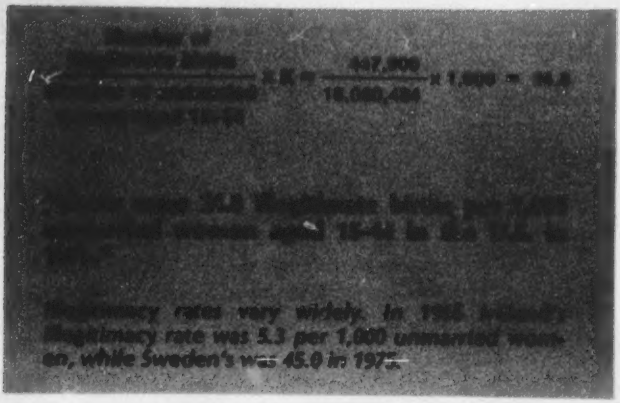
Illegitimacy Ratio

The illegitimacy ratio is the number of illegitimate live births per 1,000 live births in a given year. This ratio should not be confused with the illegitimacy *rate*, which is described on the following page.


Number of illegitimate births / Total births x K = 447,900 / 3,144,196 x 1,000 = 142.5
"There were 142.5 illegitimate births per 1,000 births in the U.S. in 1975."
Among blacks in the U.S., the 1970 illegitimacy ratio was 376 per 1,000; in 1975 it rose to 490 per 1,000. In other words, in 1975, about half of all births to blacks were illegitimate.

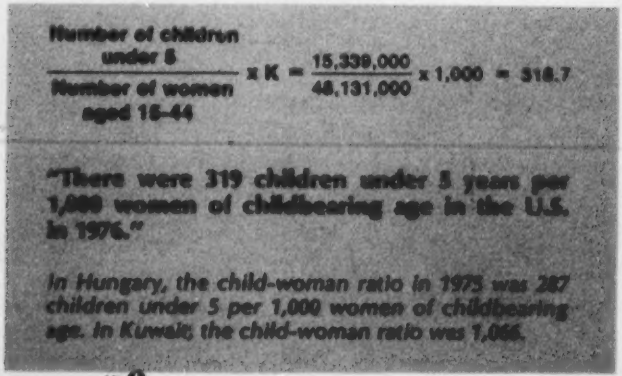
Illegitimacy Rate

The illegitimacy rate is the number of illegitimate live births per 1,000 unmarried women (i.e., single, widowed, or divorced) aged 15-44 years in a given year. This rate should not be confused with the illegitimacy *ratio*, which is described on the preceding page.



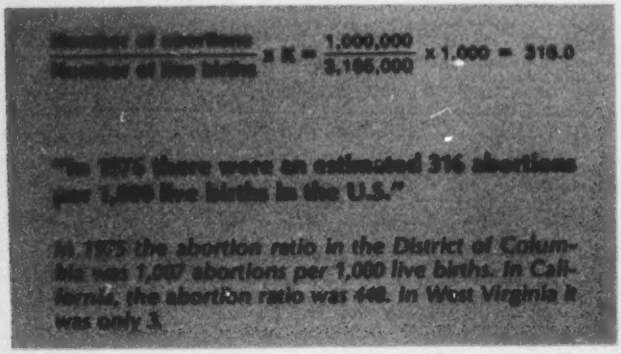
Child-Woman Ratio

The child-woman ratio is the number of children under 5 years of age per 1,000 women of childbearing age in a given year. This measure is used as a rough fertility indicator, especially when detailed data on births are lacking.


Number of children under 5 / Number of women aged 15-44 x K = 15,339,000 / 48,131,000 x 1,000 = 318.7
"There were 319 children under 5 years per 1,000 women of childbearing age in the U.S. in 1976."
In Hungary, the child-woman ratio in 1975 was 287 children under 5 per 1,000 women of childbearing age. In Kuwait, the child-woman ratio was 1,066.

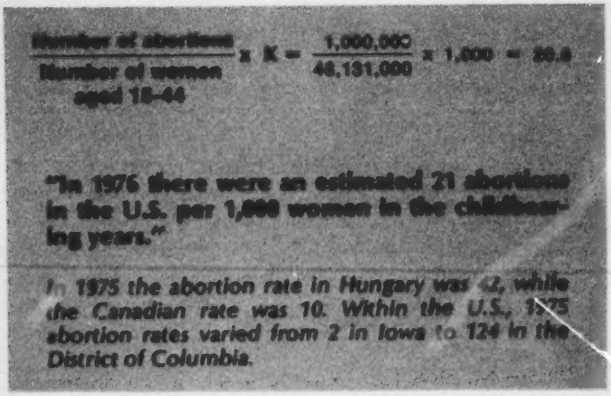
Abortion Ratio

The abortion ratio is the estimated number of abortions per 1,000 live births in a given year. This ratio should not be confused with the abortion *rate*, which is described below.


Number of abortions / Number of live births x K = 1,000,000 / 3,166,000 x 1,000 = 316.0
"In 1975 there were an estimated 316 abortions per 1,000 live births in the U.S."
In 1975 the abortion ratio in the District of Columbia was 1,007 abortions per 1,000 live births. In California, the abortion ratio was 448. In West Virginia it was only 3.

Abortion Rate

The abortion rate is the estimated number of abortions per 1,000 women aged 15-44 years in a given year. This rate should not be confused with the abortion *ratio*, which is described above.

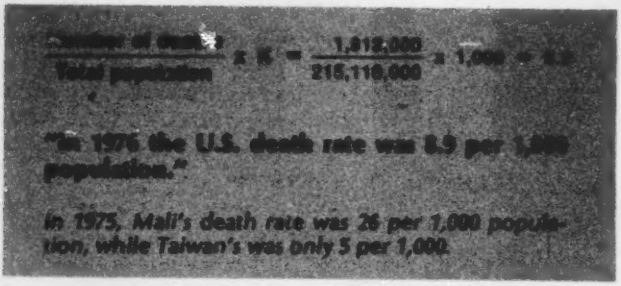

Number of abortions / Number of women aged 15-44 x K = 1,000,000 / 46,131,000 x 1,000 = 20.8
"In 1976 there were an estimated 21 abortions in the U.S. per 1,000 women in the childbearing years."
In 1975 the abortion rate in Hungary was 42, while the Canadian rate was 10. Within the U.S., 1975 abortion rates varied from 2 in Iowa to 124 in the District of Columbia.

Mortality

Mortality refers to deaths as a component of population change. Eventually death occurs to every population member, but the rate at which it occurs depends on many factors, such as age, sex, race, occupation, and social class—and its incidence can reveal much about a population's standard of living and health care.

Death Rate

The death rate (also called crude death rate) is the number of deaths per 1,000 population in a given year.


1,912,000
215,119,000
"In 1975 the U.S. death rate was 8.9 per
population."
In 1975, Mali's death rate was 26 per 1,000 population, while Taiwan's was only 5 per 1,000.

Like crude birth rates, crude death rates are affected by many population characteristics, and particularly age structure. It is therefore prudent, when comparing death rates between countries, to adjust for differences due to age composition (see comparing populations, page 15) before making conclusions about a country's health, economic, or environmental conditions.

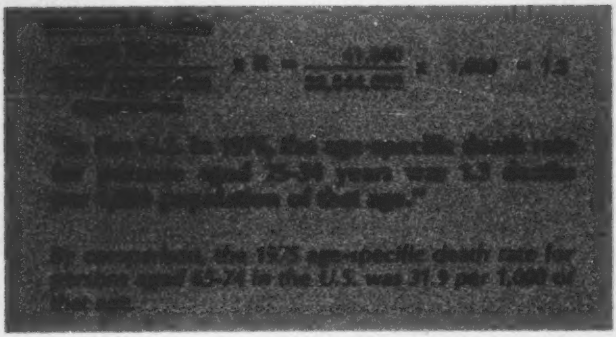
For example, Sweden's crude death rate is higher than Mexico's—11 per 1,000 population compared to 7 per 1,000—despite the fact that life expectancy in Sweden is a hale 75 years, compared to only 63 for Mexico. The difference in crude death rates is partly

attributable to the differences in age composition between the two countries. "Old" Sweden has 15 percent of its population in the 65-and-over group where deaths are more likely to occur, while "young" Mexico's proportion of elderly persons is only 3 percent of the total population. Thus, Sweden has a higher proportion of deaths in the total population each year than Mexico, even though it has better health conditions.

Age-Specific Death Rate

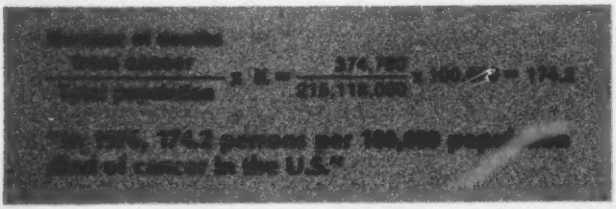
Death rates can also be obtained for specific age groups for comparison of mortality at different ages or a change in mortality at the same age over time. Comparisons can also be made between countries or areas.

Since mortality also varies greatly by sex and race, age-specific death rates are often given separately for males and females and for different racial groups in a population.



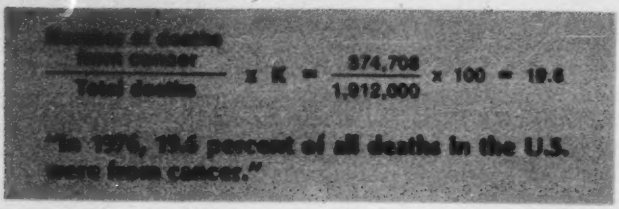
Cause-Specific Death Rates

Every death has a cause, at least for statistical purposes, even if that cause is "unknown." Basic cause-specific death rates are usually expressed in deaths per 100,000 because for most causes of deaths the rates of occurrence are so low.



Proportion Dying of a Specific Cause

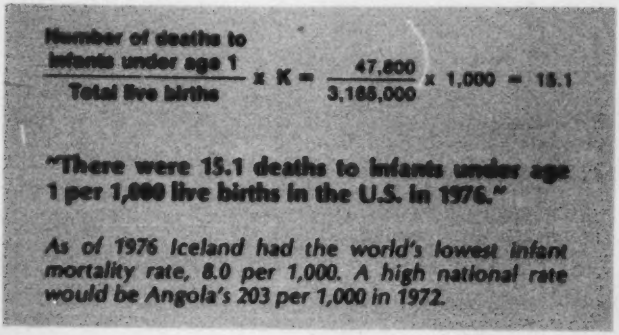
The incidence of a cause-specific death can be expressed as a percentage of all deaths.


Number of deaths from cancer / Total deaths x K = 374,708 / 1,912,000 x 100 = 19.6
"In 1976, 19.6 percent of all deaths in the U.S. were from cancer."

The causes of death vary greatly from population to population and from period to period, and are influenced by many factors, including health and environmental conditions. In 1900 in the U.S., the pneumonia-bronchitis-influenza class of diseases was the leading cause of death, accounting for 17.2 percent of all deaths, while heart disease was the cause of 7.1 percent. By 1976, however, heart disease was the leading cause of death, accounting for 38.0 percent of all deaths, while pneumonia-bronchitis-influenza caused only 3.6 percent.

Infant Mortality Rate

The infant mortality rate is the number of deaths to infants under 1 year of age per 1,000 live births in a given year.


Number of deaths to infants under age 1 / Total live births x K = 47,800 / 3,165,000 x 1,000 = 15.1
"There were 15.1 deaths to infants under age 1 per 1,000 live births in the U.S. in 1976."
As of 1976 Iceland had the world's lowest infant mortality rate, 8.0 per 1,000. A high national rate would be Angola's 203 per 1,000 in 1972.

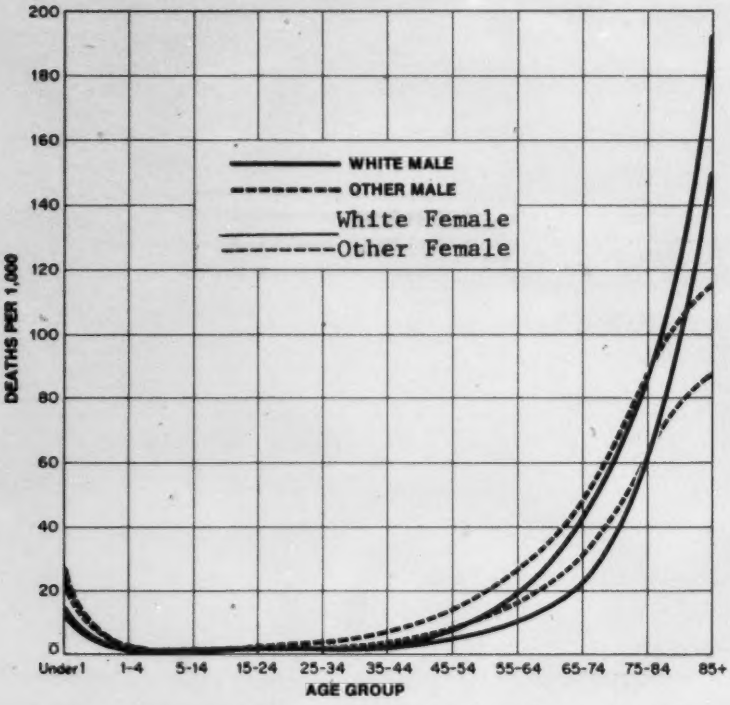
The infant mortality rate is considered a good indicator of the health status of any given area. Presently, at least a dozen nations have infant mortality rates below the U.S. level.

Maternal Mortality Rate

The maternal mortality rate is the number of women who die as a result of childbearing in a given year per 100,000 births in that year. Maternal deaths are those caused by complications of pregnancy and childbirth.

$$\frac{\text{Number of maternal deaths}}{\text{Total live births}} \times K = \frac{460}{3,166,000} \times 100,000 = 14.5$$

"There were 14.5 maternal deaths per 100,000 live births in the U.S. in 1976."



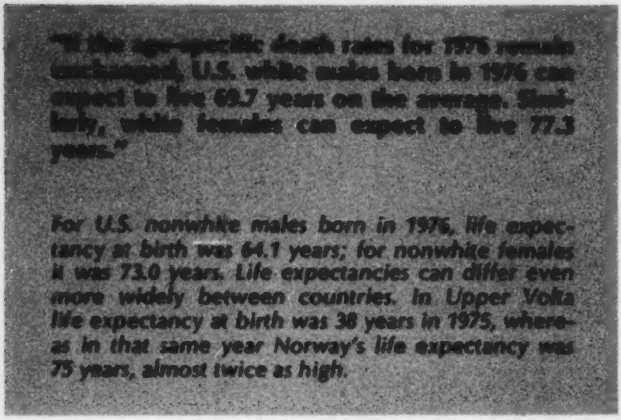
U.S. Death Rates for 1976 by Age, Sex, and Race

Source: *Monthly Vital Statistics Report, Annual Summary for the United States, 1976*, National Center for Health Statistics.

Life Expectancy

Life expectancy is an estimate of the average number of additional years a person can expect to live, based on the age-specific death rates for a given year. Since this measure differs significantly depending on a person's sex, present age, and race, these categories are usually given separately. However, life expectancy at birth is the most commonly cited life expectancy measure.

Life expectancy is a hypothetical measure and indicator of current health conditions. It is not a rate. Changing mortality trends in the future will change each person's life expectancy as he or she grows older.

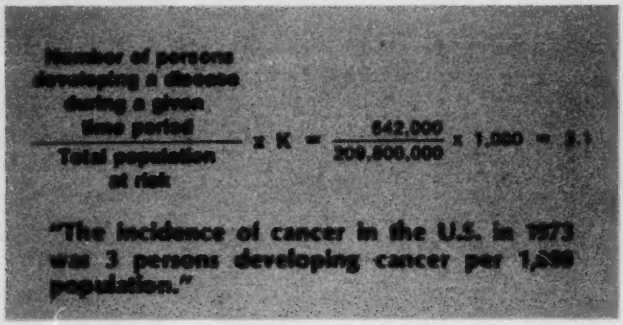

"If the age-specific death rates for 1976 remain unchanged, U.S. white males born in 1976 can expect to live 69.7 years on the average. Similarly, white females can expect to live 77.3 years."
For U.S. nonwhite males born in 1976, life expectancy at birth was 64.1 years; for nonwhite females it was 73.0 years. Life expectancies can differ even more widely between countries. In Upper Volta life expectancy at birth was 38 years in 1975, whereas in that same year Norway's life expectancy was 75 years, almost twice as high.

It should be noted that low life expectancies in developing countries are in part due to a high infant mortality rate. Today's life expectancy at birth in Egypt is 53 years, but if an Egyptian survives to 1 year of age, he or she can expect to live an average of 58 years.

Morbidity refers to disease and illness in a population. The outbreak of a disease can have serious effects on other aspects of the population. Data about the frequency and distribution of a disease can aid in controlling its spread and in some cases lead to an identification of its cause.

Incidence Rate

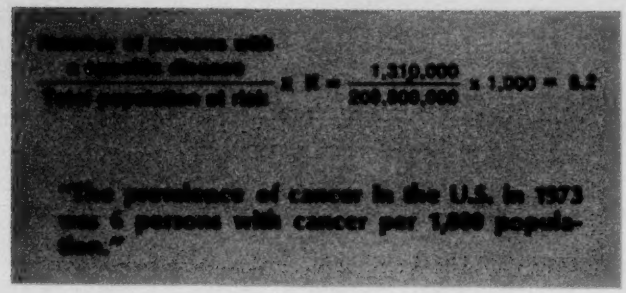
The incidence rate is the number of persons contracting a disease during a given time period per 1,000 population at risk, usually measured by counting the number of newly diagnosed cases of a disease in a given year.


Number of persons developing a disease during a given time period
Total population at risk
x K = 642,000 / 209,800,000 x 1,000 = 3.1
"The incidence of cancer in the U.S. in 1973 was 3 persons developing cancer per 1,000 population."

The incidence rate and other morbidity rates vary so widely that any constant may be used that expresses the rate in a clear manner (from "per 100" and "percent" to "per 100,000").

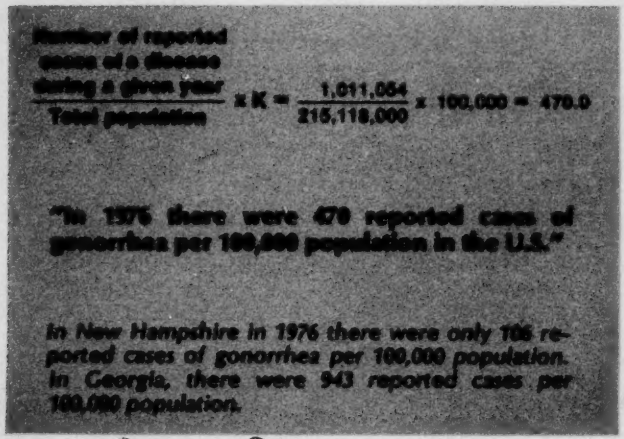
Prevalence Rate

The prevalence rate is the number of persons having a particular disease at a given point in time per 1,000 population at risk. This rate includes all previously existing cases as well as new cases developing during the specified period. The prevalence rate is a "snapshot" of an existing health situation; it describes the health status of a population.



Case Rate

The case rate is the number of reported cases of a specific disease or illness per 100,000 population during a given year. The case rate is a special type of incidence rate.


x K = 1,011,054 / 215,118,000 x 100,000 = 470.0
"In 1976 there were 470 reported cases of gonorrhea per 100,000 population in the U.S."
In New Hampshire in 1976 there were only 106 reported cases of gonorrhea per 100,000 population. In Georgia, there were 943 reported cases per 100,000 population.

Case Fatality Rate

The case fatality rate is the proportion of persons contracting a disease who die of that disease.

$$\frac{\text{Number of persons dying from the disease}}{\text{Number of persons developing the disease}} \times K = \frac{29}{181} \times 100 = 16.0$$

"As of mid-1977 the case fatality rate for Legionnaires' disease was 16 percent."

C. Audran after P. Mignard, Library of Congress

The plague

Nuptiality refers to marriage as a population phenomenon, including the rate at which it occurs, the characteristics of persons united in marriage, and the dissolution of such unions (through divorce, separation, widowhood, and annulment).

Marriage Rate

The marriage rate (also called crude marriage rate) is the number of marriages per 1,000 total population in a given year. This rate is calculated using the number of marriages—*not* the number of people getting married—and includes both first marriages and remarriages.

$$\frac{\text{Number of marriages}}{\text{Total population}} \times K = \frac{2,133,000}{215,118,000} \times 1,000 = 9.9$$

"In 1976 the crude marriage rate for the U.S. was 9.9 per 1,000 population."

Median Age at First Marriage

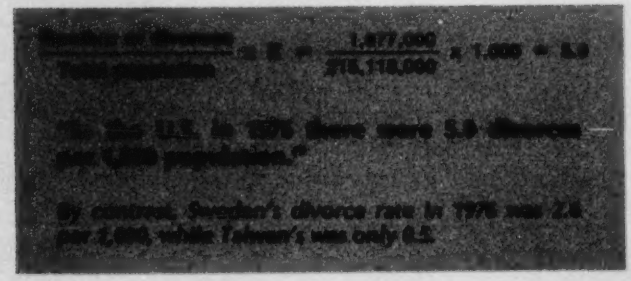
Half the married people in a population got married for the first time before the median age, half after. The median age at first marriage is usually computed separately for males and females, since females typically marry at younger ages. The median age at first marriage has an effect on a population's fertility.

"In 1976 the median age at first marriage in the U.S. was 23.8 years for males and 21.3 years for females."

Median age at first marriage varies widely: in India (in recent times), 19 years for males, 15 years for females; Sweden (in 1975), 27.5 years for males, [illegible] for females.

Divorce Rate

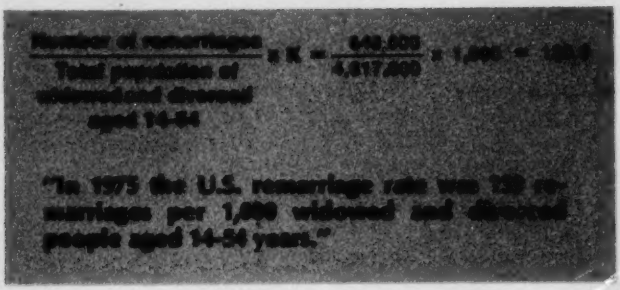
The divorce rate (or crude divorce rate) indicates the number of divorces per 1,000 population in a given year. This rate is calculated using the number of divorces—*not* the number of people being divorced.



The U.S. crude divorce rate of 5.0 per 1,000 in 1976 was double the 2.5 rate of 1965. The divorce rate is now about half the crude marriage rate, but this statistic should be interpreted with caution, since divorces that occur in any one year happen to marriages that occurred in many previous years.

Remarriage Rate

The remarriage rate is the number of remarriages (i.e., second or higher order marriages) per 1,000 population of currently divorced and widowed persons aged 14-54 years.



Migration is the movement of population; more exactly, the movement of people across a specified boundary for the purpose of residing. Along with fertility and mortality, migration is a component of population change. The terms immigration and emigration are used to refer to moves between countries (international migration). The parallel terms in-migration and out-migration are used for internal movement between different areas within a country (internal migration).

Immigration Rate

The immigration rate is the number of immigrants arriving at a destination per 1,000 population at that destination in a given year.

$$\frac{\text{Number of immigrants}}{\text{Total population at destination}} \times K = \frac{400{,}000}{215{,}118{,}000} \times 1{,}000 = 1.9$$

"In 1976 the U.S. immigration rate was 1.9 new immigrants (counting legal immigrants only) for every 1,000 residents."

In 1961 the Australian immigration rate was 12.1 per 1,000 population, a relatively high rate. By 1976 the Australian rate had dropped to 3.8.

Emigration Rate

The emigration rate is the number of emigrants departing an area of origin per 1,000 population at that area of origin in a given year.

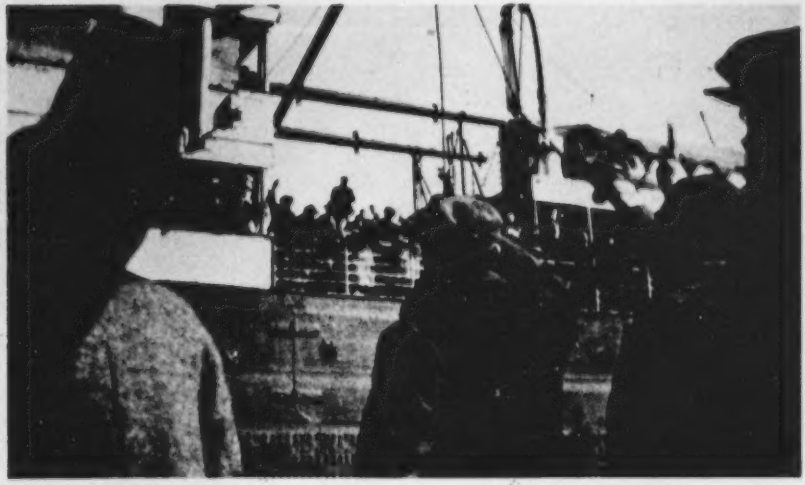
$$\frac{\text{Number of emigrants}}{\text{Total population at area of origin}} \times K = \frac{40,000}{215,116,000} \times 1,000 = 0.2$$

"In 1976, the U.S. emigration rate was estimated to be 0.2 per 1,000 Americans."

No hard data on U.S. emigration are available, only rough estimates.

Net Migration

The net effect of immigration and emigration on an area's population can be expressed as increase or decrease.

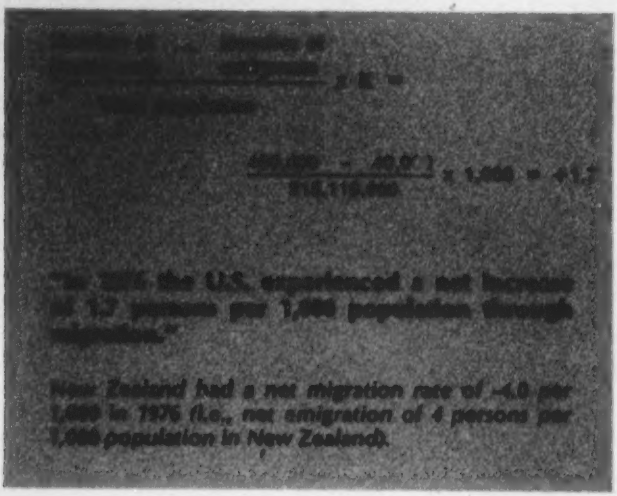


U.S. Public Health Service

Emigrants departing Ireland, 1928

Net Migration Rate

The net migration rate shows the net effect of immigration and emigration on an area's population, expressed as increase or decrease per 1,000 population of the area in a given year.



Illegal Migration

In reporting migration rates and population estimates and projections, the U.S. Census Bureau uses only the reported number of *legal* immigrants. In the 1970s, illegal migration to the U.S., mainly from Latin America and the Caribbean, has become a problem of increasing concern. There are no exact statistics, however, on either the illegal migration rate or the total number of illegal aliens currently in the U.S.

In 1976 about 900,000 illegal aliens were apprehended. It is estimated that during that time period at least an equal number managed to slip undetected across the border or violated the terms of their legal admission to the U.S., for example, by failing to depart after expiration of a student visa. Although no one knows for sure, estimates of the current number of illegal aliens in the U.S. range from 4 million to over 12 million; that is, 2 to 6 percent of the entire U.S. population.

Urbanization is the increase in the proportion of the population living in urban areas—the process of people moving to cities or other densely settled areas. Population distribution refers to the patterns of settlement and dispersal of population within a country or other area.

"Urban"

Countries differ widely in their definition of "urban," but essentially this term refers to cities and other densely settled areas. Criteria such as city population size, population density, and percentage of labor force employed in nonagricultural activities are often used to define what constitutes an urban area.

In the U.S., by Census Bureau definition, "urban" includes all cities of 50,000 or more inhabitants and the closely settled area around them (which together constitute "urbanized areas"), plus all incorporated places and unincorporated places with at least 2,500 inhabitants. All the rest is "rural."

Metropolitan Area

A metropolitan area is defined as a large concentration of population, usually an area with 100,000 or more inhabitants and containing at least one city with 50,000 or more inhabitants and those administrative areas bordering the city which are socially and economically integrated with the city.

SMSAs

Standard Metropolitan Statistical Area (SMSA) is an official designation of the U.S. Office of Management and Budget. It is applied to U.S. urban areas made up

of a county or group of counties with at least one city (or "twin cities") of 50,000 or more population. All adjacent counties which are metropolitan in character and economically and socially integrated with the central city are identified as part of the SMSA.

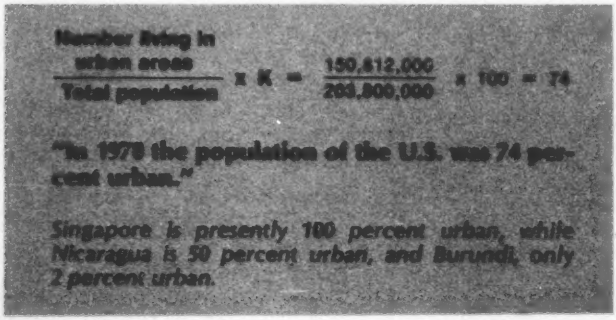
Today over 275 SMSAs are listed by the Office of Management and Budget. In recent years, the term SMSA has become almost synonymous with the idea of a large, metropolitan area in the minds of the public, local boosters, and the media.

Megalopolis

A group of closely connected metropolitan areas is sometimes called a megalopolis. Such an urban agglomeration may be hundreds of miles long and include several large cities and millions of people: for example, the so-called "Bos-Wash" megalopolis, which extends 500 miles along the U.S. Eastern Seaboard, from north of Boston to south of Washington, D.C., and includes over 60 million people.

Percent Urban

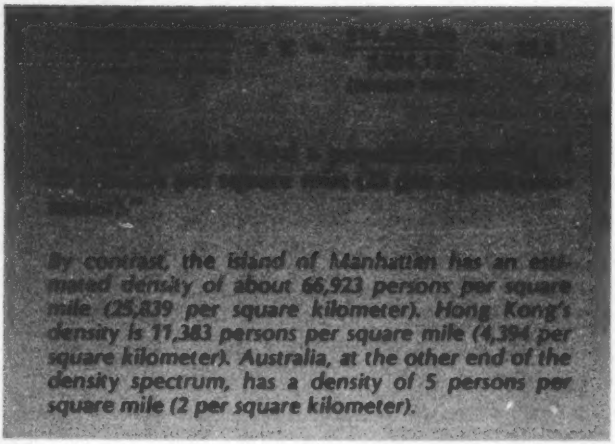
The population living in urban areas can be expressed as a percentage of the total population. Usually, the remainder of the population not living in urban areas constitutes the rural population, though some countries also have a middle category, "semi-urban."


Number living in urban areas / Total population x K = 150,612,000 / 203,800,000 x 100 = 74
"In 1978 the population of the U.S. was 74 percent urban."
Singapore is presently 100 percent urban, while Nicaragua is 50 percent urban, and Burundi, only 2 percent urban.

Population Density

Population density is usually expressed as the number of people per unit of land area.

Density figures are often more meaningful if given as population per unit of arable land; for example, in 1977 Egypt had an estimated 100 persons per square mile (39 per square kilometer) of its total land area, but about 3,305 persons per square mile (1,276 per square kilometer) of *arable* land. Other useful "density" measures are the average number of persons per household or per room—measures that are sometimes used to show crowding.



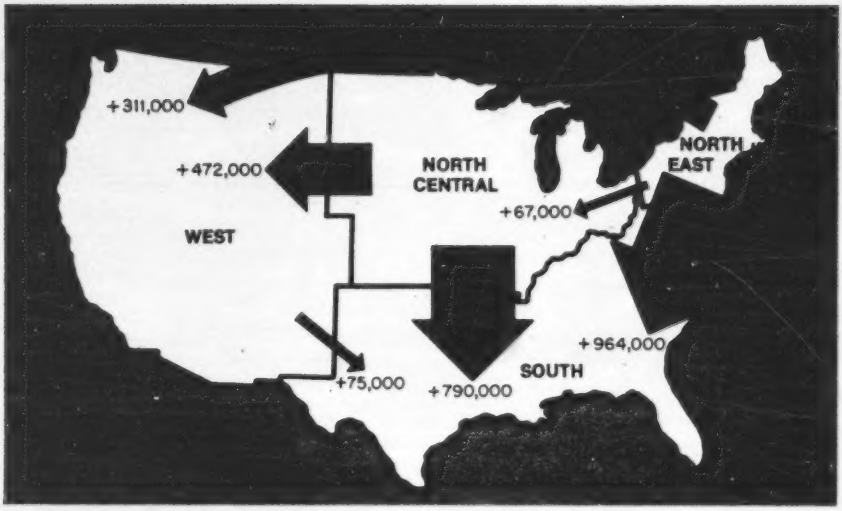
By contrast, the island of Manhattan has an estimated density of about 66,923 persons per square mile (25,839 per square kilometer). Hong Kong's density is 11,383 persons per square mile (4,394 per square kilometer). Australia, at the other end of the density spectrum, has a density of 5 persons per square mile (2 per square kilometer).

The "Sunbelt" and America's "Rural Renaissance"

The U.S. has one of the most migratory populations in the world, with almost one in every five Americans moving each year. Since 1970 two important migration trends in the U.S. have been receiving wide attention. One is the increasing migration of Americans to the "Sunbelt," the region made up of Southern and Southwestern states. This shift in population from the Northeast and North Central states to the South and Southwest has resulted in dramatic changes in the demographic and socioeconomic profiles of both the sending and receiving areas.

Another notable trend in the U.S. in recent years has been the abrupt and surprising reversal of the long-established trend to urbanization. In fact, for the first time in this century, and probably the nation's history, more Americans are moving away from metropolitan areas than are moving to them. Coupled with falling birth rates, this movement has halted population growth in many large urban areas since 1970 and brought net migration gains even to areas far removed from metropolitan influence.

Many factors have contributed to these recent migratory shifts, including the increasing preference of Americans for warmer climates and less crowded living conditions, the relocation of businesses, the proliferation of controlled-access highways, and the growth of recreational and retirement communities.



U.S. Migration Trends, 1970-1975

Source: *Population Redistribution in the United States in the 1970s*, by Brian J. L. Berry and Donald C. Dahmann. Washington, D.C., National Research Council, National Academy of Sciences, 1977.

Population change has three components: births, deaths, and migration. As people are born, die, or move, their total numbers in an area may change. During most of history, world population has increased very slowly, but during the 20th century this growth has accelerated.

The Balancing Equation

The most basic method of calculating numerical population change over time is the "balancing equation."

$$P_2 = P_1 + (B - D) + (I - E)$$

Where P_2 is the population at the later date, P_1 is the population at the earlier date, B is births and D is deaths between the two dates, and I is immigration (or in-migration) and E is emigration (or out-migration) between the two dates.

215,913,000 = 214,300,000 + (3,166,000 − 1,212,000)
U.S. population Jan. 1977 = U.S. population Jan. 1976 + (Births 1976 − Deaths 1976)

+ (400,000 − 40,000)
(legal) immigration 1976 − emigration 1976

"During 1976, the U.S. population increased by 1.6 million."

This estimate does not take into account any illegal immigration into the country.

Natural Increase

Natural increase is the surplus (or deficit) of births over deaths in a population in a given time period.

$$NI = B - D$$

Where NI is the natural increase during a period, and B is births and D is deaths during that period.

Rate of Natural Increase

The rate of natural increase is the rate at which a population is increasing (or decreasing) in a given year due to a surplus (or deficit) of births over deaths, expressed as a percentage of the base population. This rate does not include the effects of immigration or emigration.

$$\frac{\text{Births 1976} - \text{Deaths 1976}}{\text{Total population mid 1976}} \times K =$$

$$\frac{3{,}165{,}000 - 1{,}912{,}000}{215{,}118{,}000} \times 100 = 0.6$$

The rate of natural increase can also be calculated from birth and death rates:

$$\frac{\text{Birth rate} - \text{Death rate}}{10} = \frac{15 - 9}{10} = 0.6$$

"In 1976, the U.S. rate of natural increase was 0.6 percent."

Growth Rate

The growth rate is the rate at which a population is increasing (or decreasing) in a given year due to natural increase *and* net migration, expressed as a percentage of the base population.

The growth rate takes into account all components of population growth: births, deaths, and migration. It should never be confused with birth rate (see page 17), but sometimes is.

$$\frac{\text{Births 1976} - \text{Deaths 1976} \pm \text{Net migration 1976}}{\text{Total population mid 1976}} \times K =$$

$$\frac{3,165,000 - 1,912,000 + 360,000}{215,118,000} \times 100 = 0.8$$

The growth rate can also be calculated from natural increase and net migration rates:

$$\text{Rate of natural increase} + \text{Net migration rate} = 0.6 + 0.2 = 0.8$$

"In 1976, the U.S. annual growth rate was 0.8 percent."

Birth rates and population growth characteristically fluctuate. A growth rate that is declining does *not* necessarily mean that an area's population is declining (although occasional media reports seize on this interpretation). It may mean that the population is *growing at a slower rate.* A negative growth rate means that an area is losing population. Today, only a few countries are experiencing a decline in total population, but numerous other countries are experiencing a decline in their rates of population growth.

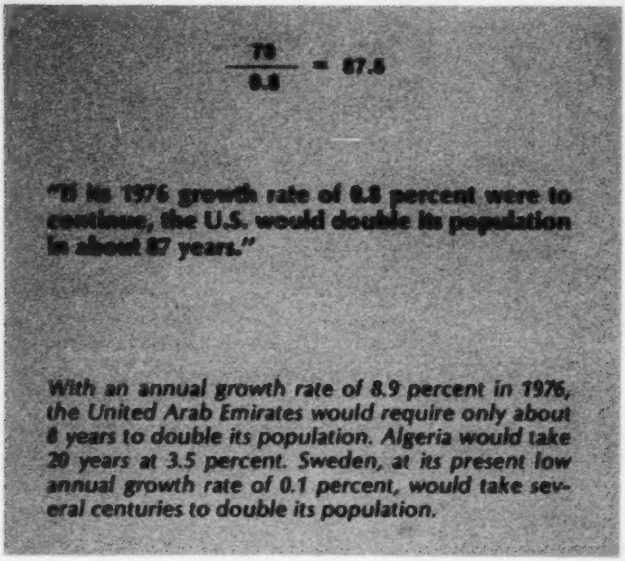
"In 1978, the world's population was growing at an annual rate of 1.7 percent. (To put it another way, it was increasing by 17 per 1,000 population per year.) This growth rate means that in 1978 the world was increasing by over 70 million people a year."

The United Arab Emirates, growing at 8.9 percent annually in the mid-1970s, has the world's highest growth rate, due to both a high rate of natural increase and a high net immigration rate. The German Democratic Republic, on the other hand, has been shrinking at an annual negative growth rate of -0.2 percent.

Doubling Time

Growth expressed as a percentage is not always very informative. (Is a 3 percent growth rate fast or slow?) Sometimes a more vivid way of showing population growth is to calculate how long, at its current growth rate, a population would take to double in size. A country with a constant growth rate of 1 percent would double its population in 70 years; 2 percent, in 35 years; 3 percent, in 23 years.

A short way to estimate doubling time is to divide 70 by the growth rate expressed as a percent.


70
0.8
= 87.5
"If its 1976 growth rate of 0.8 percent were to continue, the U.S. would double its population in about 87 years."
With an annual growth rate of 8.9 percent in 1976, the United Arab Emirates would require only about 8 years to double its population. Algeria would take 20 years at 3.5 percent. Sweden, at its present low annual growth rate of 0.1 percent, would take several centuries to double its population.

Doubling time is at best a crude way of estimating future population size, because it assumes a constant growth rate over decades, whereas growth rates are always changing. Nonetheless, calculating doubling time helps to give a picture of just how fast a population is growing at the present time.

The world's population took 100 years to double from 1 billion to 2 billion. It then took only 46 years to double from 2 billion to 4 billion, and at present rates, will double again in another 41 years.

The Demographic Transition Theory

The most widely accepted theory explaining population change over time is the demographic transition theory. It states that a population's fertility and mortality will both decline from high to low levels as a result of economic and social development. The decline in mortality usually precedes the decline in fertility, resulting in high population growth during the transition period.

Finland is a good example of a country that has passed through the four stages of the demographic transition.

Stage I. High birth rate, high death rate = little or no increase. *(Finland in 1785-1790)*

birth rate 38 per 1,000
death rate 32 per 1,000
rate of natural increase 0.6 percent

Stage II. High birth rate, falling death rate = high growth rate *(Finland in 1825-1830)*

birth rate 38 per 1,000
death rate 24 per 1,000
rate of natural increase 1.4 percent

Stage III. Declining birth rate, relatively low death rate = slowed growth *(Finland in 1910-1915)*

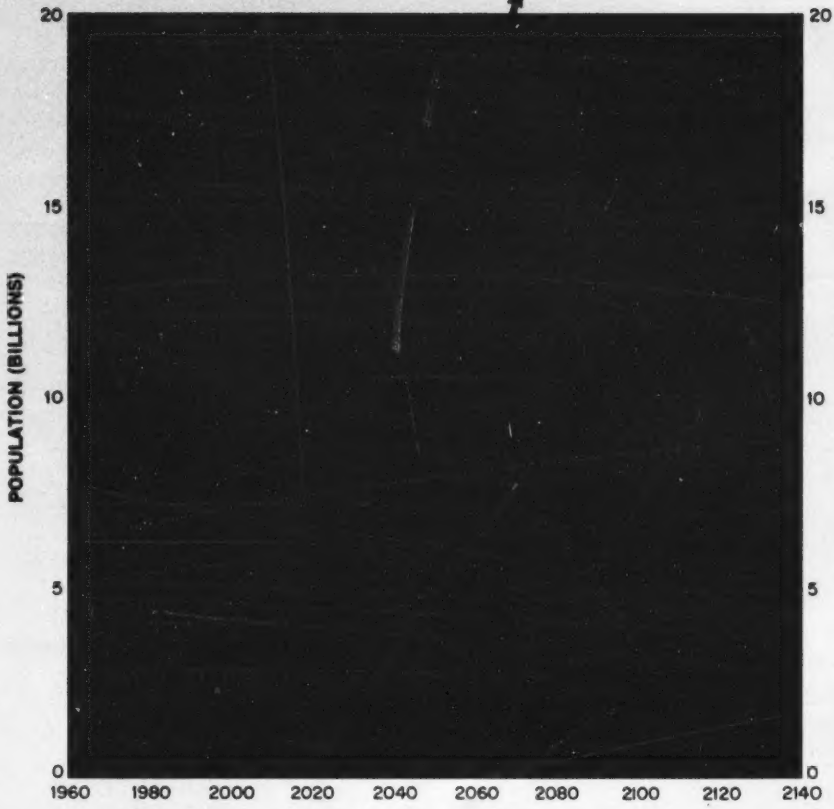
birth rate 29 per 1,000
death rate 17 per 1,000
rate of natural increase 1.2 percent

Stage IV. Low death rate, low birth rate = very low population growth *(Finland in 1970-1976)*

birth rate 13 per 1,000
death rate 10 per 1,000
rate of natural increase 0.3 percent

Zero Population Growth

Zero population growth (ZPG) means no population increase or decrease. A population could reach this balance in several ways: (a) births equaling deaths (as would happen in a population that had been at replacement level fertility for a long time) and net migration equal to zero; (b) births exceeding deaths, but the surplus balanced by net emigration; (c) deaths exceeding births, but the deficit balanced by net immigration.



World Population: Three Alternate Futures

The above chart shows three possible paths of future world population growth. The constant path assumes that the 1978 growth rate will continue unchanged into the future. The slow fertility reduction path assumes that the world's fertility will decline to reach replacement level by the year 2040. Under this assumption the world's population would stabilize at about 15 billion by the 22nd century. The rapid fertility reduction path assumes that the world's fertility will rapidly decline to reach replacement level by the year 2000. Under this assumption the world's population could stabilize at about 8 billion sometime during the 21st century. World fertility (at an estimated total fertility rate of 4.1 in 1975) is unlikely to decline to replacement level in just two decades, but could possibly reach that point sometime in the early 21st century. Thus, the world's actual growth curve should come somewhere between the slow and rapid curves shown above. Exactly where the curve appears, and what level (from 8 to 15 billion) the world's population finally peaks at, will depend on the persistence and success of efforts toward development and family planning in the developing world.

Source: Population Reference Bureau

In 1976 a number of European countries, including the Federal Republic of Germany, the German Democratic Republic, Austria, Switzerland, the United Kingdom, and Luxembourg experienced negative population growth rates. Except for Switzerland, these countries now have birth rates equal to or lower than their death rates due to both a preference for smaller and smaller families and their relatively aged populations. Switzerland's recent population loss and that of the United Kingdom are due in part to net emigration.

There is nothing magic about the ZPG level; even the most stable, self-replacing population would continue to grow or shrink slightly over time, rather than remain in perfect equilibrium. ZPG is simply a demarcation line on a scale of population growth rates. Above the line, a population is increasing; below the line, it is losing population.

Population and the Future

During most of history, the human race has increased very slowly. It took hundreds of thousands of years for the world to reach 1 billion in total population (which happened about 1830). But then growth began to accelerate as death rates fell; it took only 100 years to reach 2 billion (about 1930); only 30 years to reach 3 billion (in 1960); only 16 years to reach 4 billion (in 1976). Reaching 5 billion is expected to take less than 15 years.

In 1978 the birth rate of the world was 29 live births per 1,000 population; the death rate was 12 per 1,000 population; and the rate of natural increase was 1.7 percent annually, resulting in an annual increase of over 70 million people. Projecting this rate into the future shows the world's population reaching 1 trillion (1,000,000,000,000) in the year 2299, but such a fantastic figure is unlikely to occur in reality. Long before that point is reached, the growth curve will level off—as a result of the birth rate going down, the death rate going up, or a combination of the two.

Much has been written in recent years about the "population explosion" or the "population bomb." However, population events by their nature occur gradually, not cataclysmically. The "population explosion"—overpopulation—is not a catastrophe that threatens the world on some specific Doomsday in the future. Rather, it is a quiet day-to-day event that in

some parts of the world has already happened, with dismal results: overcrowding, depletion of available resources, chronic malnutrition, and starvation. Some observers feel that population pressures have already stretched the earth's biological systems to the breaking point.

The trend to overpopulation is not inexorable, fortunately. After decades of high rates, there are signs that the world's birth rate is dropping (from about 35 per 1,000 in 1960 to below 30 per 1,000 in the late 1970s) because of the demographic transition taking place in many countries, which is in part due to the wide spread of family planning programs over the last decade.

In August 1974 the World Population Conference was held in Bucharest. There, representatives from 136 countries met and for the first time formally recognized the scope and complexity of the population problem. They approved a World Population Plan of Action, which stated that all couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education, and means to do so.

How big will the world's population become? No one can say for sure. It is possible, some experts think, that if the trend to lower birth rates continues, the world's population might reach only 5½ or 6 billion by the year 2000, instead of the 6½ or 7 billion that had been projected in the past. According to this speculation, growth would continue thereafter, but at a much slower pace than the breakneck rates of the mid-20th century. However, as Robert S. McNamara, President of the World Bank, has said, "Unless governments . . . can accelerate the reduction in fertility, the global population might not stabilize below 11 billion. That would be a world none of us would want to live in."

Obviously, what happens to the birth rate and other world demographic trends is of great importance to policymakers, journalists, and anyone interested in the world's present—and future. Every day, the news, government reports, and scientific studies testify to the increasing consequences of population change. Population has always been part of the study of history. During the rest of this century, as never before, history will be the study of population.

Glossary

ABORTION RATE. The estimated number of abortions per 1,000 women aged 15-44 years in a given year.

ABORTION RATIO. The estimated number of abortions per 1,000 live births in a given year.

AGE-DEPENDENCY RATIO. The ratio of persons in the ages defined as dependent (under 15 and over 64 years) to those in the ages defined as economically productive (15-64 years) in a population.

AGE-SEX STRUCTURE. The composition of a population as determined by the number or proportion of males and females in each age category. The age-sex structure of a population is the cumulative result of past trends in fertility, mortality, and migration. Information on age-sex composition is an essential prerequisite for the description and analysis of many other types of demographic data. See also *population pyramid.*

AGE-SPECIFIC RATE. Rate obtained for specific age groups (for example, age-specific fertility rate, death rate, marriage rate, illiteracy rate, school enrollment rate, etc.).

AGING OF POPULATION. A gradual process in which the proportions of adults and elderly increase in a population, while the proportions of children and adolescents decrease. This results in a rise in the median age of the population. Aging occurs when fertility rates decline while life expectancy remains constant or improves at the older ages.

ANTINATALIST POLICY. The policy of a government, society, or social group to slow population growth by attempting to limit the number of births.

"BABY BOOM." The period following World War II from 1947-1961 marked by a dramatic increase in fertility rates and in the absolute number of births in the U.S., Canada, Australia, and New Zealand.

"BABY BUST." The period immediately after the baby boom marked by a rapid decline in U.S. fertility rates to record low levels.

BALANCING EQUATION. A basic demographic formula used to estimate total population change between two points in time—or to estimate any unknown component of population change providing the other components are known. The balancing equation includes all com-

ponents of population change: births, deaths, immigration, and emigration.

BIRTH CONTROL. Practices employed by couples that permit sexual intercourse with reduced likelihood of conception. The term birth control is often used synonymously with such terms as contraception, fertility control, and family planning.

BIRTH RATE (or crude birth rate). The number of births per 1,000 population in a given year. Not to be confused with *growth rate*.

BRAIN DRAIN. The emigration of a significant proportion of a country's highly skilled, highly educated professional population, usually to other countries offering better economic and social opportunity (for example, physicians leaving a developing country to practice medicine in a developed country).

CARRYING CAPACITY. The maximum sustainable size of a resident population in a given ecosystem.

CASE FATALITY RATE. The proportion of persons contracting a disease who die of that disease.

CASE RATE. The number of reported cases of a specific disease per 100,000 population in a given year.

CAUSE-SPECIFIC DEATH RATE. A mortality rate indicating the number of deaths attributable to a specific cause per 100,000 population in a given year.

CENSUS. A canvass of a given area, resulting in an enumeration of the entire population, and the compilation of demographic, social, and economic information pertaining to that population at a specific time. See also *survey*.

CHILDBEARING YEARS. The reproductive age span of women, arbitrarily assumed for statistical purposes to be 15-44 years in the U.S. In other countries, the range is often set at 15-49 years.

CHILD-WOMAN RATIO. The number of children under 5 years old per 1,000 women aged 15-44 years in a population. This crude fertility measure, based on basic census data, is sometimes used when more specific fertility information is not available.

CLOSED POPULATION. A population with no migratory flow in or out, so that changes in population size occur only through births and deaths.

COHORT. A group of people sharing a common temporal demographic experience who are observed through time. For example, the birth cohort of 1900 would be the people born in that year. There are also marriage cohorts, school class cohorts, etc.

COHORT ANALYSIS. Observation of a cohort's demographic behavior through life or through many periods; for example, examining the fertility behavior of the cohort of

people born between 1900-1909 through their entire childbearing years. Rates derived from such a cohort analysis are cohort measures. Compare *period analysis.*

COMPLETED FERTILITY RATE. The number of children born per woman in a cohort of women by the end of their childbearing years.

CONSENSUAL UNION. Cohabitation by an unmarried couple for an extended period of time. Consensual unions may be quite stable, but in official statistics people living in such unions are considered to be unmarried and their children technically illegitimate.

CRUDE RATE. Rate of any demographic event computed for an entire population.

DEATH RATE (or crude death rate). The number of deaths per 1,000 population in a given year.

DEMOGRAPHIC TRANSITION. The historical shift of birth and death rates from high to low levels in a population. The decline of mortality usually precedes the decline in fertility, thus resulting in rapid population growth during the transition period.

DEMOGRAPHY. (Greek, *demos* [people] + *graphie* [study]). The scientific study of human populations, including their size, composition, distribution, density, growth, and other demographic and socioeconomic characteristics, and the causes and consequences of changes in these factors.

DEPENDENCY RATIO. The ratio of the economically dependent part of the population to the productive part; arbitrarily defined as the ratio of the elderly (those 65 years and over) plus the young (those under 15 years of age) to the population in the "working ages" (those 15-64 years of age.

DEPOPULATION. The state of population decline.

DIVORCE RATE (or crude divorce rate). The number of divorces per 1,000 population in a given year.

DOUBLING TIME. The number of years required for a population of an area to double its present size, given the current rate of population growth.

EMIGRATION. The process of leaving one country to take up residence in another.

EMIGRATION RATE. The number of emigrants departing an area of origin per 1,000 population at that area of origin in a given year.

EXPONENTIAL GROWTH. A constant rate of growth applied to a continuously growing base over a period of time; for example, a savings account increasing at compound interest; a snowball gathering mass; a population growing at 3.0 percent annually.

FAMILY PLANNING. The conscious effort of couples to regulate the number and spacing of births. Family planning usually connotes the use of birth control to avoid pregnancy, but also includes efforts of couples to induce pregnancy.

FECUNDITY. The physiological capacity of a woman, man, or couple to produce a live child.

FERTILITY. The actual reproductive performance of an individual, a couple, a group, or a population.

FERTILITY RATE. See *general fertility rate.*

GENERAL FERTILITY RATE. (also referred to as fertility rate). The number of live births per 1,000 women aged 15-44 years in a given year.

GROSS REPRODUCTION RATE (GRR). The average number of daughters that would be born alive to a woman (or group of women) during her lifetime if she passed through her childbearing years conforming to the age-specific fertility rates of a given year. See *net reproduction rate* and *total fertility rate.*

GROWTH RATE. The rate at which a population is increasing (or decreasing) in a given year due to natural increase and net migration, expressed as a percentage of the base population.

ILLEGAL ALIEN (sometimes called undocumented alien.) A foreigner who has entered a country without inspection or without proper documents, or who has violated the terms of legal admission to the country, for example, by overstaying the duration of a tourist or student visa.

ILLEGITIMACY RATE. The number of illegitimate live births per 1,000 unmarried women (single, widowed, or divorced) aged 15-44 years in a given year.

ILLEGITIMACY RATIO. The number of illegitimate live births per 1,000 live births in a given year.

IMMIGRATION. The process of entering one country from another to take up permanent residence.

IMMIGRATION RATE. The number of immigrants arriving at a destination per 1,000 population at that destination in a given year.

INCIDENCE RATE. The number of persons contracting a disease as a proportion of the population at risk, per unit of time.

INFANT MORTALITY RATE. The number of deaths to infants under one year of age in a given year per 1,000 live births in that year.

IN-MIGRATION. The process of entering one administrative subdivision of a country (e.g., county or state) from another subdivision to take up residence.

LIFE EXPECTANCY. The average number of additional years a person would live if current mortality trends were to continue. Most commonly cited as life expectancy at birth.

LIFE SPAN. The maximum age that human beings could reach under optimum conditions. The human life span appears to be about 100 years.

LIFE TABLE. A tabular display of life expectancy and the probability of dying at each age for a given population, according to the age-specific death rates prevailing at that time. The life table gives an organized, complete picture of a population's mortality.

MALTHUS, THOMAS R. (born 1766; died 1834). English clergyman and economist famous for his theory (expounded in the "Essay on the Principle of Population") that the population of the world tends to increase faster than the food supply and that unless fertility is controlled, famine, vice, disease, and war must serve as natural population restrictions. See *neo-Malthusian*.

MARITAL FERTILITY RATE. Number of legitimate live births per 1,000 married women aged 15-44 years in a given year.

MARRIAGE RATE (or crude marriage rate). The number of marriages per 1,000 population in a given year.

MATERNAL MORTALITY RATE. The number of deaths to women due to pregnancy and childbirth complications per 100,000 live births in a given year.

MEAN AGE. The average age of all the members of a population.

MEDIAN AGE. The age which divides a population into two numerically equal groups; that is, half the people are younger than this age and half are older.

MEGALOPOLIS. A loose term denoting an interconnected group of cities and connecting urbanized bands.

METROPOLITAN AREA. A large concentration of population; usually an area with 100,000 or more inhabitants and containing at least one city with 50,000 or more inhabitants and those administrative areas bordering the city which are socially and economically integrated with the city.

MIGRATION. The movement of people across a specified boundary for the purpose of establishing a new permanent residence. Divided into international migration (migration between countries) and internal migration (migration within a country).

MOBILITY. Geographic movement of people.

MORBIDITY. The frequency of disease and illness in a population.

MORTALITY. Deaths as a component of population change.

NATALITY. Births as a component of population change.

NATURAL INCREASE. The surplus (or deficit) of births over deaths in a population in a given time period.

NEGATIVE POPULATION GROWTH. A net decrease in the size of a population.

NEO-MALTHUSIAN. Advocate of restricting population growth through the use of birth control. (Malthus himself did not advocate birth control as a remedy for too-rapid population growth.)

NEONATAL MORTALITY RATE. The number of deaths to infants under 28 days of age in a given year per 1,000 live births in that year.

NET MIGRATION. The net effect of immigration and emigration on an area's population in a given time period, expressed as increase or decrease.

NET MIGRATION RATE. The net effect of immigration and emigration on an area's population, expressed as increase or decrease per 1,000 population of the area in a given year.

NET REPRODUCTION RATE (NRR). The average number of daughters that would be born to a woman (or group of women) if she passed through her lifetime from birth conforming to the age-specific fertility and mortality rates of a given year. This rate is similar to the gross reproduction rate, but takes into account that some women will die before completing their childbearing years. An NRR of 1.00 means each generation of mothers is having exactly enough daughters to replace itself in the population. See *gross reproduction rate, total fertility rate,* and *replacement level fertility.*

NUPTIALITY. The frequency, characteristics, and dissolution of marriages in a population.

OLD POPULATION. A population with a relatively high proportion of middle-aged and aged persons, a high median age, and thus a lower growth potential.

OUT-MIGRATION. The process of leaving one subdivision of a country to take up residence in another.

PARITY. The number of children previously born alive to a woman; for example, "two-parity women" are women who have had two children up until now, and "zero-parity women" have had no children up until now.

PERINATAL MORTALITY RATE. The number of fetal deaths after 28 weeks of pregnancy (late fetal deaths) plus the number of deaths to infants under 7 days of age per 1,000 live births.

PERIOD ANALYSIS. Observation of a population in a specific period of time. Such an analysis in effect "takes a snapshot" of a population in a relatively short time period; for

example, the U.S. general fertility rate for the year 1975. Most rates derived from period data are period rates. Compare *cohort analysis.*

POPULATION. A group of objects or organisms of the same kind.

POPULATION DENSITY. Population per unit of land area; for example persons per square mile, or persons per square kilometer of arable land.

POPULATION DISTRIBUTION. The patterns of settlement and dispersal of a population.

"POPULATION EXPLOSION" or "POPULATION BOMB." Expressions used to describe the 20th century worldwide trend of enormous and rapid population growth resulting from a world birth rate much higher than the world death rate.

"POPULATION IMPLOSION." A change in the distribution of population from a pattern of thinly dispersed groups dependent upon a variety of environments to relatively densely settled industrial or agricultural communities. Urbanization is the principal modern process of population implosion.

POPULATION INCREASE. The total population increase resulting from the interaction of births, deaths, and migration in a population in a given period of time.

POPULATION MOMENTUM. The tendency for population growth to continue beyond the time that replacement level fertility had been achieved because of a relatively high concentration of people in the childbearing years.

POPULATION OPTIMUM. The ideal number of people that can be sustained in a given area, in contrast to overpopulation and underpopulation.

POPULATION POLICY. Explicit or implicit measures instituted by a government to influence population size, growth, distribution, or composition.

POPULATION PROJECTION. Computation of future changes in population numbers, given certain assumptions about future trends in the rates of fertility, mortality, and migration. Demographers often issue low, medium, and high projections of the same population, based on different assumptions of how these rates will change in the future.

POPULATION PYRAMID. A special type of bar chart that shows the distribution of a population by age and sex. Most countries fall into one of three general types of pyramids: (1) Expansive—a broad base, indicating a high proporation of children and a rapid rate of population growth; (2) Constrictive—a base that is narrower than the middle of the pyramid, usually the result of a recent rapid

decline in fertility; (3) Stationary—a narrow base and roughly equal numbers in each age group, tapering off at the older ages, indicating a moderate proportion of children and a slow or zero rate of growth.

POPULATION REGISTER. A government data collection system in which the demographic and socioeconomic characteristics of all or part of the population are continuously recorded. Denmark, Sweden, and Israel are among the countries that maintain universal registers for demographic purposes—recording the major events (birth, marriage, moves, death, etc.) that happen to each individual so that up-to-date information on the whole population is readily available. Other countries, like the U.S., keep partial registers for administrative purposes, such as social security, voter registration, etc.

POSTNEONATAL MORTALITY RATE. The annual number of infant deaths at 28 days to one year of age per 1,000 live births in a given year.

PREVALENCE RATE. The number of persons having a particular disease at a given point in time per population at risk.

PRONATALIST POLICY. The policy of a government, society, or social group to increase population growth by attempting to raise the number of births.

"PUSH-PULL" HYPOTHESIS. A migration theory that suggests that circumstances at the place of origin (such as poverty and unemployment) repel or push people out of that place to other places that exert a positive attraction or pull (because of such factors as a high standard of living and job opportunities).

RATE OF NATURAL INCREASE. The rate at which a population is increasing (or decreasing) in a given year due to a surplus (or deficit) of births over deaths, expressed as a percentage of the base population.

REMARRIAGE RATE. The number of remarriages per 1,000 formerly married (i.e., widowed or divorced) persons in a given year.

REPLACEMENT LEVEL FERTILITY. The level of fertility at which a cohort of women on the average are having only enough daughters to "replace" themselves in the population. By definition, replacement level is equal to a net reproduction rate of 1.00. The total fertility rate is also used to indicate replacement level fertility; in the U.S. today a TFR of 2.12 is considered to be replacement level.

REPRODUCTIVE AGE. See *childbearing years.*

SEX RATIO. The number of males per 100 females in a population.

STABLE POPULATION. A population with an unchanging rate of growth and an unchanging age composition, be-

cause of birth and death rates having remained constant over a sufficiently long period of time.

STANDARD METROPOLITAN STATISTICAL AREA (SMSA). A U.S. metropolitan area defined by the Office of Management and Budget as containing at least one city (or twin cities) of 50,000 or more population, the county in which it is located, and any adjacent counties that are both metropolitan in character and socially and economically integrated with the central city.

STANDARDIZATION (or age-adjustment). A statistical technique used to enhance the comparison of populations by controlling for the effects of their differing age compositions. Standardization may be used to adjust for other factors as well.

STATIONARY POPULATION. A stable population with both a zero growth rate because the birth rate equals the death rate and an unchanging age composition.

SURVEY. A canvass of selected persons or households in a population usually used to infer demographic characteristics or trends for a larger segment or all of the population. See also *census.*

SURVIVAL RATE. The proportion of persons in a specified group (age, sex, health status, etc.) alive at the beginning of an interval (e.g., a 5-year period) who survive to the end of the interval.

TOTAL FERTILITY RATE (TFR). The average number of children that would be born alive to a woman (or group of women) during her lifetime if she were to pass through her childbearing years conforming to the age-specific fertility rates of a given year. See also *gross reproduction rate* and *net reproduction rate.*

URBAN AREA. In the U.S., "incorporated and unincorporated places of 2,500 or more inhabitants, plus the urbanized zones around cities of 50,000 or more inhabitants," according to the Bureau of the Census. Definitions vary from country to country.

URBANIZATION. Growth in the proportion of a population living in urban areas.

VITAL STATISTICS. Demographic data on births, deaths, fetal deaths, marriages, and divorces.

YOUNG POPULATION. A population with a relatively high proportion of children, adolescents, and young adults, a low median age, and thus a high growth potential.

ZERO POPULATION GROWTH. A population in equilibrium, with a growth rate of zero, achieved when births plus immigration equal deaths plus emigration.

Population Reference Bureau, Inc.

1337 Connecticut Avenue N.W.
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Founded in 1929, the Population Reference Bureau is a private, nonprofit educational organization supported by foundation grants, individual and corporate contributions, memberships, and sales of publications. PRB gathers, interprets, and publishes information on the facts and implications of national and world population trends and also operates information and library services. PRB's Population Education Department encourages the inclusion of population issues in school or college curricula by publishing teaching materials and conducting training sessions in population and development. PRB is a data resource for current demographic data and special reports from the U.S. Bureau of the Census, the National Center for Health Statistics, the United Nations, and the World Health Organization.

Any population-related question may be directed to PRB's Staff Demographer or Reference Librarian. If they are unable to provide the required information, they will gladly refer you to the organization or individual best able to answer your information request.

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Phone Contacts

General

Population Reference Bureau	202-785-4664
U.S. Census Bureau	301-763-7273
National Center for Health Statistics	301-436-8500
U.N. Population Division	212-754-8039
World Health Organization	202-223-5347
U.N. Statistical Office	212-754-5628
U.S. Census Bureau, International Statistical Program Center	301-763-2870

Family Planning

National Center for Health Statistics, Family Planning Statistics Branch	301-436-7129
Planned Parenthood Federation of America	212-541-7800
Alan Guttmacher Institute	212-752-2100 202-296-4012
The Population Council	212-644-1300
Center for Disease Control, Family Planning Division	404-633-3311
International Planned Parenthood Federation	212-679-2230
U.S. Agency for International Development	703-235-8117

Fertility

National Center for Health Statistics, Natality Statistics Division	301-436-8954
U.S. Census Bureau, Fertility Statistics Branch	301-763-5303

U.N. Population Division 212-754-8039
U.N. Statistical Office 212-754-5628
U.S. Agency for International Development .. 703-235-8117
The Population Council 212-644-1300

Mortality and Morbidity

National Center for Health Statistics, Mortality Division 301-436-8884
Center for Disease Control, Morbidity and Mortality Statistics Branch 404-633-3311
U.N. Population Division 212-754-8039
U.N. Statistical Office 212-754-5628
World Health Organization 202-331-5347

Education/Statistics

National Center for Educational Statistics 202-245-8511

Environment, Resources, and Population

U.S. Environmental Protection Agency 202-755-0707
Environmental Fund 202-293-2548
Worldwatch Institute 202-452-1999

Population and Development

The Population Council 212-644-1300
World Bank 202-393-6360
Overseas Development Council 202-234-8701

Marriage, Divorce, and the Family

National Center for Health Statistics, Marriage and Divorce Statistics Branch 301-436-8977
U.S. Census Bureau, Population Division 301-763-5002

Migration and Immigration

U.S. Census Bureau, Population Division 301-763-5002
U.S. Immigration and Naturalization Service, Statistical Branch 202-376-8377
U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service 202-447-8200
U.N. Population Division 212-754-8039

Urbanization and Population Distribution

U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service 202-447-8200
U.N. Population Division 212-754-8039

Labor Force and Employment

U.S. Bureau of Labor Statistics 202-523-1913
U.N. International Labor Office 212-697-0150
202-634-6335

Food Supply and Population

U.S. Department of Agriculture, Agricultural Statistics 202-447-8902
U.N. Food and Agriculture Organization 202-634-6215
Worldwatch Institute 202-452-1999

Social and Economic Statistics

U.S. Census Bureau, Population Division 301-763-5002
U.S. Department of Commerce, Bureau of Economic Analysis 202-523-0777
U.N. Statistical Office 212-754-5628
World Bank 202-477-5728

Population Policy

Alan Guttmacher Institute 212-752-2100
202-296-4012
Population Institute 212-687-3366
202-544-3300
Zero Population Growth 202-785-0100
Population Crisis Committee ... 212-582-2220
202-659-1833
The Population Council 212-644-1300

Population Estimates and Projections

U.S. Census Bureau Population Estimates Section 301-763-7722
U.S. Census Bureau Projections Section 301-763-5300
U.N. Population Division 212-754-8039

Population Media Relations

Population Institute 212-687-3366

References

Quick Data Aids

Statistical Abstracts of the United States (published annually) by the Department of Commerce, Washington, D.C.: U.S. Government Printing Office.
United Nations Demographic Yearbook (published annually)
United Nations Statistical Yearbook (published annually)
World Population Data Sheet (published annually) by the Population Reference Bureau, Inc., Washington, D.C.

Population Periodicals

Current Population Reports, a voluminous group of population studies published frequently in various series by the U.S. Bureau of the Census. Of particular interest are Series P-20, Population Characteristics; Series P-23, Special Studies; Series P-25, Estimates and Projections of the Population.
Demography, a scholarly journal published quarterly by the Population Association of America.
Monthly Vital Statistics, a brochure published monthly by the U.S. Center for Health Statistics, giving the most current data and recent trends of U.S. births, deaths, marriages, divorces, and other vital statistics.
People, a popular magazine published quarterly by the International Planned Parenthood Federation (IPPF), London, on population-related topics.
Population Index, a compilation published quarterly for PAA by the Office of Population Research, Princeton University, consisting of abstracts of population-related scholarly articles recently published worldwide, arranged by subject.
Population Studies, a scholarly journal published three times a year by the Population Investigation Committee, London School of Economics, London.

Suggested General Reading

Society and Population by David M. Heer. Englewood Cliffs, N.J.: Prentice-Hall, second edition, 1975.
Introduction To Population by Judah Matras. Englewood Cliffs, N.J.: Prentice-Hall, 1977.
Population by William Peterson. New York, N.Y.: Macmillan, third edition, 1975.

Directories of Population Organizations

Sourcebook on Population: 1970-1976. Washington: Population Reference Bureau.
International Directory of Population Information and Library Resources (3 vols.). Chapel Hill, N.C.: Carolina Population Center, 1972-1975.
Directory of the Population-Related Community of the Washington, D.C. Area. Washington, D.C.: D.C. Chapter of the World Population Society, third edition, April 1978.

Universities with Graduate Departments Emphasizing Demography

United States

Brown University, Providence, R.I. 02912 (S)
California, University of, Berkeley, Calif. 94720 (S)
California, University of, Los Angeles, Calif. 90024 (S)
Chicago, University of, Chicago, Ill. 60637 (S)
Columbia University, New York, N.Y. 10027 (S, A)
Connecticut, University of, Storrs, Conn. 06268 (S)
Cornell University, Ithaca, N.Y. 14850 (S)
Duke University, Durham, N.C. 27706 (S)
Emory University, Atlanta, Ga. 30322 (S)
East-West Population Institute, East-West Center, Honolulu, Hi. 96822 (D)
Florida, University of Gainesville, Fla. 32601 (S)
Florida State University, Tallahassee, Fla. 32306 (S)
Georgia, University of, Athens, Ga. 30601 (S)
Georgetown University, Washington, D.C. 20057 (S)
Harvard University, Cambridge, Mass. 02138 (S, E, PH)
Iowa State University, 204 E Hall, Ames, Iowa 50010 (S)
Johns Hopkins University, Baltimore, Md. 21218 (S, PH)
Kansas State University, Manhattan, Kan. 66502 (S)

Kentucky, University of, Lexington, Ky. 40506 (S)
Louisiana State University, Baton Rouge, La. 70803 (S)
Maryland, University of, College Park, Md. 20742 (S)
Massachusetts, University of, Amherst, Mass. 01003 (S)
Michigan, University of, Ann Arbor, Mich. 48104 (S, E, PH)
Michigan State University, East Lansing, Mich. 48823 (S)
Minnesota, University of, Minneapolis, Minn. 55455 (S)
Missouri, University of, Columbia, Mo. 65201 (S)
New School for Social Research, 66 W. 12th St., New York, N.Y. 10011 (S)
New York, State University of (Buffalo), 4224 Ridge Lea Campus, Buffalo, N.Y. 14226
North Carolina, University of, Chapel Hill, N.C. 27514 (S, PH)
Notre Dame, University of, Notre Dame, Ind. 46556 (S)
Ohio State University, Columbus, Ohio 43210 (S)
Oregon, University of, Eugene, Ore. 97403 (S)
Pennsylvania, University of, Philadelphia, Pa. 19104 (S, E, D)
Pennsylvania State University, University Park, Pa. 16802 (S)
Pittsburgh, University of, Pittsburgh, Pa. 15213 (E, PH)
Princeton University, Princeton, N.J. 08540 (S, E, D)
Southern California, University of, Los Angeles, Calif. 90007 (S)
Stanford University, Palo Alto, Calif. 94305 (S)
Tennessee, University of, Knoxville, Tenn. 37916 (S)
Texas, University of, Austin, Tex. 78712 (S)
Tulane University, New Orleans, La. 70118 (S)
Washington, University of, Seattle, Wash. 98105 (S)
Wisconsin, University of, Madison, Wis. 53706 (S)

Canada

Alberta, University of, Edmonton 7, Alberta (S)
British Columbia, University of, Vancouver 8 (S)
Manitoba, University of, Winnipeg 19
Montreal, Universite de, C.P., 6128, Montreal
Toronto, University of, 565 Spadina Avenue, Toronto
Western Ontario, University of, London, Ontario

Source: PAA "Careers in Demography"

KEY:

A Anthropology
E Economics
D Demography
PH Public Health
S Sociology

Professional Population Associations

These major associations of demographers and population experts hold conferences on population-related subjects and also publish directories of their members.

Population Association of America (PAA)
P.O. Box 14182, Benjamin Franklin Station
Washington, D.C. 20044
202-393-3253

Southern Regional Demographic Group
William Serow, Secretary/Treasurer
c/o Tayloe-Murphy Institute
University of Virginia
Charlottesville, Va. 22904

International Union for the Scientific Study of Population (IUSSP)
Rue Forgeur, 5
4000 Liege
Belgium

World Population Society (WPS)
1337 Connecticut Avenue N.W.
Suite 200
Washington, D.C. 20036
202-833-2440

Other groups that include demographically oriented sessions in their annual conferences are the American Public Health Association, American Statistical Association, American Sociological Association, American Association for the Advancement of Science, and the Federal Statistics Users Conference.

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